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Cover photo by © John Cang of San Jose, California: Black Rail *(Laterallus jamaicensis)*, Palo Alto, California, January, 1998.

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WESTERN BIRDS

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SEABIRDS IN SOUTHEASTERN HAWAIIAN WATERS

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Waters within 200 nautical miles (370 km) of North America and the Hawaiian Archipelago (the exclusive economic zone) are considered as within North American boundaries by bird records committees (e.g., Erickson and Terrill 1996). Seabirds within 370 km of the southern Hawaiian Islands (hereafter referred to as Hawaiian waters) were studied intensively by the Pacific Ocean Biological Survey Program (POBSP) during 15 months in 1964 and 1965 (King 1970). These researchers replicated a trackline each month and provided considerable information on the seasonal occurrence and distribution of seabirds in these waters. The data were primarily qualitative, however, because the POBSP surveys were not based on a strip of defined width nor were raw counts corrected for bird movement relative to that of the ship (see Analyses). As a result, estimation of density (birds per unit area) was not possible.

From 1984 to 1991, using a more rigorous survey protocol, we re-surveyed seabirds in the southeastern part of the region (Figure 1). In this paper we provide new information on the occurrence, distribution, effect of oceanographic factors, and behavior of seabirds in southeastern Hawaiian waters, including density estimates of abundant species. We also document the occurrence of six species unrecorded or unconfirmed in these waters, the Parasitic Jaeger (*Stercorarius parasiticus*), South Polar Skua (*Catharacta maccormicki*), Tahiti Petrel (*Pterodroma rostrata*), Herald Petrel (*P. heraldica*), Stejneger's Petrel (*P. longirostris*), and Pycroft's Petrel (*P. pycrofti*).

STUDY AREA AND SURVEY PROTOCOL

Our study was a piggyback project conducted aboard vessels studying the physical oceanography of the eastern tropical Pacific. Our transects were

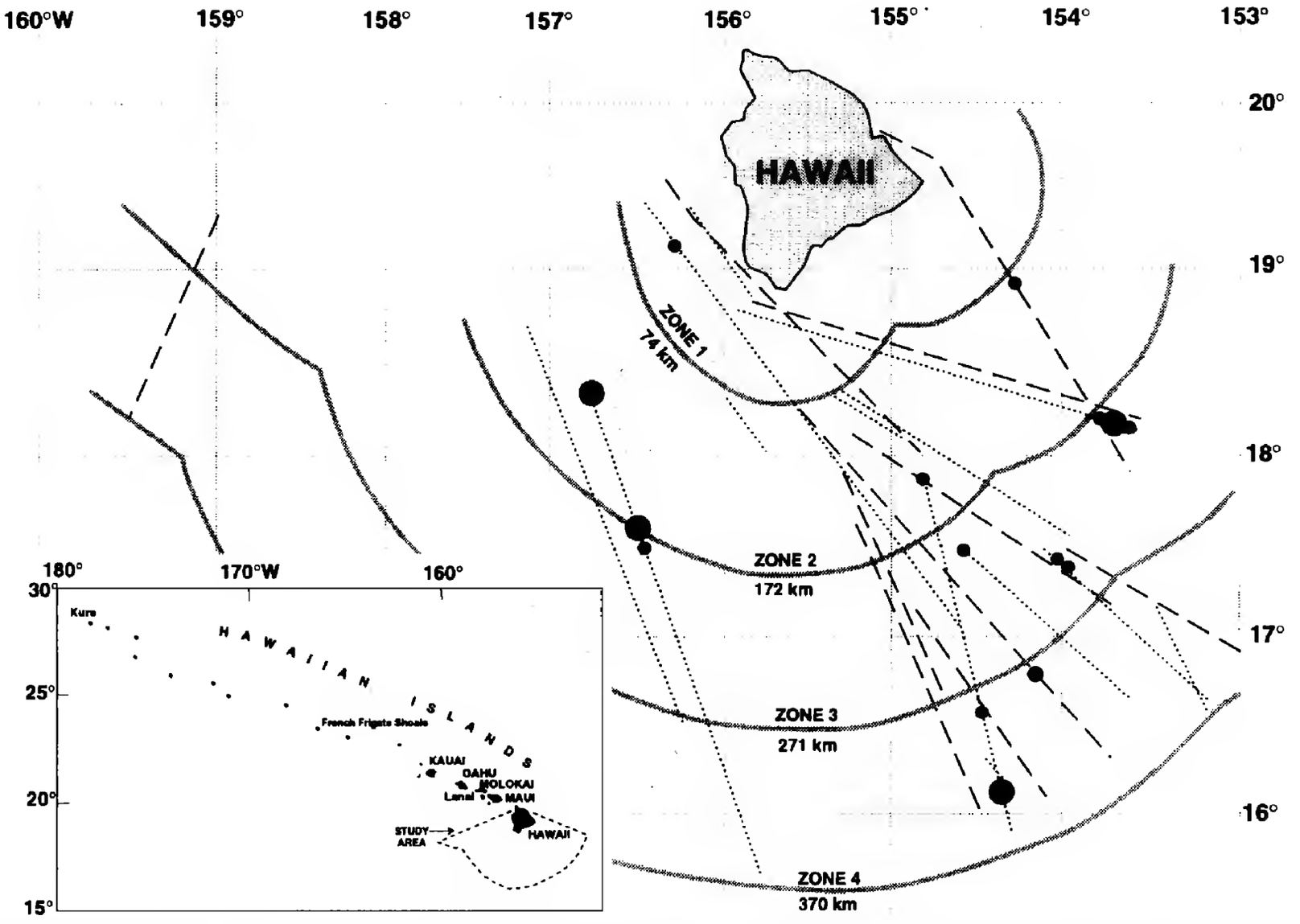

Figure 1. Study area in southeastern Hawaiian waters showing zones 1–4 and cruise tracks over which seabird surveys were conducted. Dotted lines, spring cruises; dashed lines, autumn cruises; small dots, locations of feeding flocks of 5 to 50 birds; medium-sized dots, flocks of 50 to 100 birds; large dots, flocks of >100 birds.

concentrated south and southeast of the island of Hawaii (Figure 1). While the ship was underway during daylight, at least two persons surveyed seabirds simultaneously from the flying bridge. Using the strip-transect survey method (see Spear et al. 1992a), they counted all seabirds seen within a strip of given width off the forequarter offering the best observation conditions. Strip width, determined as per Heinemann (1981), was 500 or 600 m depending on height of the flying bridge of the three vessels used (14 and 15 m above sea level). Alternating between observers, we used hand-held binoculars to scan the outer portion of the transect strip nearly constantly for birds missed with the unaided eye. We used a 25 × 150 mm mounted binocular to aid species identification. We recorded behavior and, for birds flying in a steady direction, recorded flight direction to the nearest 10°. We also recorded species and numbers of birds in feeding flocks (>4 birds pursuing prey) that passed within 2000 m.

Every 0.5 hr we recorded the ship's position, speed, and course. We conducted 289 transects, each of 0.5 hr except those terminated when the ship stopped, and calculated the area surveyed as the survey period multiplied by strip width and ship speed. Our effort comprised 72.1 hrs of surveys over 971.6 km^2 during spring (18 April through 27 June), and 71.9 hrs covering 1156.8 km^2 during autumn (7 October through 20 November), 1984–1991 (Table 1). Surveys were not conducted in spring 1985 or autumn 1986 and 1988.

Each 0.5 hr we also recorded sea-surface temperature and salinity, thermocline depth and "slope" (see below), wind direction (nearest 10°), wind speed, and distance from land. Thermocline depth and slope, indices of mixing in the water column, were monitored with expendable bathythermographs. Thermocline depth is the point where the warm surface layer meets cooler water below; i.e., the shallowest inflection point determined from bathythermograph plots of temperature with depth. Exceptions were when there was no inflection point, indicating that the thermocline was at the surface, or there was more than one inflection, when we assumed that the thermocline began at the depth of the strongest inflection. We measured thermocline slope as the temperature difference between the thermocline and a point 20 m below the thermocline.

ANALYSES

To estimate bird densities, we corrected observed (raw) numbers for the effect of flight speed and direction of birds relative to the ship's speed and course (Spear et al. 1992a; flight speeds from Spear and Ainley 1997). Without these corrections, densities from at-sea survey data are usually overestimated, particularly for fast fliers. The correction also is required because any patterns in bird or ship direction will bias analyses. For example, if birds flew east and west at the same speed and in equal numbers, uncorrected counts from a ship traveling west would show greater numbers flying east because the observer would count more that were flying east than west.

We calculated densities for each transect by dividing the corrected count by the number of square kilometers surveyed and report densities as birds

Table 1 Survey Effort in Hawaiian Waters by Date

Year	Day	Hours of survey	Area surveyed (km^2)
1984	8 May	6.5	85.9
1984	9 May	2.0	25.8
1984	18 May	5.0	55.8
1984	19 May	1.0	12.8
1984	5 Nov	5.5	79.2
1985	16 Oct	8.5	132.6
1985	30 Oct	8.5	120.8
1986	18 Jun	4.5	60.7
1987	31 May	2.5	39.0
1987	7 Oct	5.5	92.9
1988	4 Jun	5.8	85.8
1988	19 Jun	5.0	83.1
1989	2 May	9.0	143.2
1989	27 Jun	8.5	107.8
1989	17 Nov	7.0	122.1
1989	20 Nov	6.5	105.2
1990	21 Apr	10.8	101.0
1990	7 Nov	5.4	91.8
1990	15 Nov	8.5	134.7
1991	18 Apr	4.0	66.9
1991	25 Apr	7.5	106.6
1991	12 Nov	11.0	194.8
1991	19 Nov	5.5	82.7
Total			
8	23	144.0	2128.4

per 100 km^2 of ocean surface. For predominant species (definition given below), unless noted otherwise, all abundance estimates pertain to corrected counts, with variance given as one standard error. We report only raw numbers in accounts of less frequent species. The POBSP calculated abundance differently; precluding between-study comparisons of absolute abundance.

We recognized three species groups: "breeding residents," species that breed on the Hawaiian Islands, "nonbreeding residents," species that do not breed on the Hawaiian Islands but reside in the study area as prebreeders or during the nonbreeding season, and "migrants," species that migrate across the study area when traveling between breeding and wintering areas.

We divided the study area into four zones (Figure 1): zone 1, 0 to 73 km from Hawaii; zone 2, 74 to 172 km; zone 3, 173 to 271 km; and zone 4, 272 to 370 km. Respectively by zone, we surveyed 130.8 (10.8 hrs), 289.7 (22.0 hrs), 291.4 (22.3 hrs), and 259.7 km^2 (17.0 hrs) of ocean surface during spring, and 140.9 (9.0 hrs), 324.1 (19.9 hrs), 362.4 (22.5 hrs) and 329.1 (20.5 hrs) km^2 during autumn. During April, May, June, October, and November, we surveyed 274.5, 359.7, 337.4, 346.3, and 810.5 km^2 of ocean surface, respectively.

Using the STATA program (STATA Corp. 1995), we used multiple-regression analyses and Sidak multiple-comparison tests (an improved version of the Bonferroni test; SAS Institute 1985) to compare seabird densities by zone, season, and species group. The sample unit was one 0.5-hr transect. We also use log-likelihood ratio (G) tests to examine proportional differences.

We log-transformed densities to satisfy assumptions of normality (skewness/kurtosis test for normality of residuals, $P > 0.05$). Because no birds were seen during 87 (30%) of the 289 transects, densities included values of zero. As a result, transformations were calculated as the log (density + 1). Experimentation with different modifications [e.g., log (density + 0.5)] showed no appreciable effect of choice of modifications on probabilities (P). All analyses of variance were of the log-transformed density values. Normality was not achieved in all analyses, but least-squares regression (ANOVA) is considered to be very robust with respect to non-normality (Seber 1977, Kleinbaum et al. 1988). Although regression analyses yield the best linear unbiased estimator relating density to independent variables, even in the absence of normally distributed residuals, P values at the lower levels of significance must be regarded with caution (Seber 1977). Therefore, to reduce the chances of committing a Type I error, we assumed significance for ANOVAs at $P \leq 0.02$. We included two- and three-order polynomials in regression analysis to test for curvilinearity.

Unless noted otherwise, species accounts pertain only to transect data; i.e., they do not include feeding flocks seen outside the transect zone. All references to the POBSP refer to King (1970). Seasons are defined as in the northern hemisphere.

RESULTS

Seasonal Distributions

We recorded 32 species, including 15 species of breeding residents, 11 nonbreeding residents, and six migrants (Table 2). During spring, densities of breeding residents were significantly higher than those of nonbreeding resident; those of migrants were significantly lower (Sidak tests, all $P < 0.01$, Figure 2). During autumn, densities among the three groups differed insignificantly (Sidak test, all $P > 0.1$). During spring, densities of breeding residents were significantly higher, those of migrants significantly lower than during autumn (Sidak tests, df = 287, both $P < 0.01$, Figure 2). Between the two seasons, densities of nonbreeding residents differed insignificantly (Sidak test, $P = 0.3$).

During spring, densities were significantly higher in zones 1 and 4 than during autumn (Sidak tests, both $P < 0.01$, Figure 3), but in zones 2 and 3 they did not differ significantly (both $P > 0.6$). The lack of a significant difference in the latter two zones resulted in a marginally insignificant difference (ANOVA, $F[1,287] = 4.88$, $P = 0.028$) in overall density between spring (52.5 ± 10.20 birds per 100 km^2, $n = 145$ transects) and autumn (32.2 ± 6.12 birds per 100 km^2, $n = 144$), controlled for zone. Thus, for a given zone, there was a marginally insignificant trend for densities to be greater during spring than autumn.

Table 2 Raw and Corrected Counts and Status of Seabirds Recorded in Southeastern Hawaiian Waters, 1984–1991

Species	Raw	Corrected[a]	Status[b]
Diomedeidae			
Black-footed Albatross, *Phoebastria nigripes*	3	3.0	BR
Procellariidae			
Newell's Shearwater, *Puffinus newelli*	27	17.0	BR
Christmas Shearwater, *P. nativitatis*	1	0.4	BR
Sooty Shearwater, *P. griseus*	164	105.7	MI
Buller's Shearwater, *P. bulleri*	2	2.0	MI
Wedge-tailed Shearwater, *P. pacificus*	202	175.3	BR
Juan Fernandez Petrel, *Pterodroma externa*	41	40.1	NO
White-necked Petrel, *P. cervicalis*	18	23.1	NO
Dark-rumped Petrel, *P. phaeopygia*	29	24.8	BR
Tahiti Petrel, *P. rostrata*	2	1.2	NO
Kermadec Petrel, *P. neglecta*	8	5.6	NO
Murphy's Petrel, *P. ultima*	1	1.0	MI
Herald Petrel, *P. heraldica*	3	2.3	NO
Mottled Petrel, *P. inexpectata*	58	31.7	MI
Black-winged Petrel, *P. nigripennis*	94	81.2	NO
Pycroft's Petrel, *P. pycrofti*	5	7.6	NO
Stejneger's Petrel, *P. longirostris*	7	5.0	MI
Bulwer's Petrel, *Bulweria bulwerii*	59	49.2	BR
Oceanitidae			
Leach's Storm-Petrel, *Oceanodroma leucorhoa*	35	41.2	NO
Harcourt's Storm-Petrel, *Oceanodroma castro*	2	2.2	BR
Phaethontidae			
Red-tailed Tropicbird, *Phaethon rubricauda*	4	4.0	BR
White-tailed Tropicbird, *Phaethon lepturus*	8	6.0	BR
Sulidae			
Red-footed Booby, *Sula sula*	1	0.4	BR
Fregatidae			
Great Frigatebird, *Fregata minor*	3	1.2	BR
Laridae			
South Polar Skua, *Catharacta maccormicki*	1	0.6	NO
Pomarine Jaeger, *Stercorarius pomarinus*	9	13.5	NO
Parasitic Jaeger, *Stercorarius parasiticus*	2	2.5	NO
Sooty Tern, *Sterna fuscata*	238	231.6	BR
Arctic Tern, *Sterna paradisaea*	7	4.3	MI
White Tern, *Gygis alba*	14	19.1	BR
Brown Noddy, *Anous stolidus*	1	1.0	BR
Black Noddy, *Anous minutus*[c]			BR

[a]See Methods, Analyses.

[b]BR, breeding resident; NO, nonbreeding resident; MI, migrant.

[c]Seen in feeding flocks only.

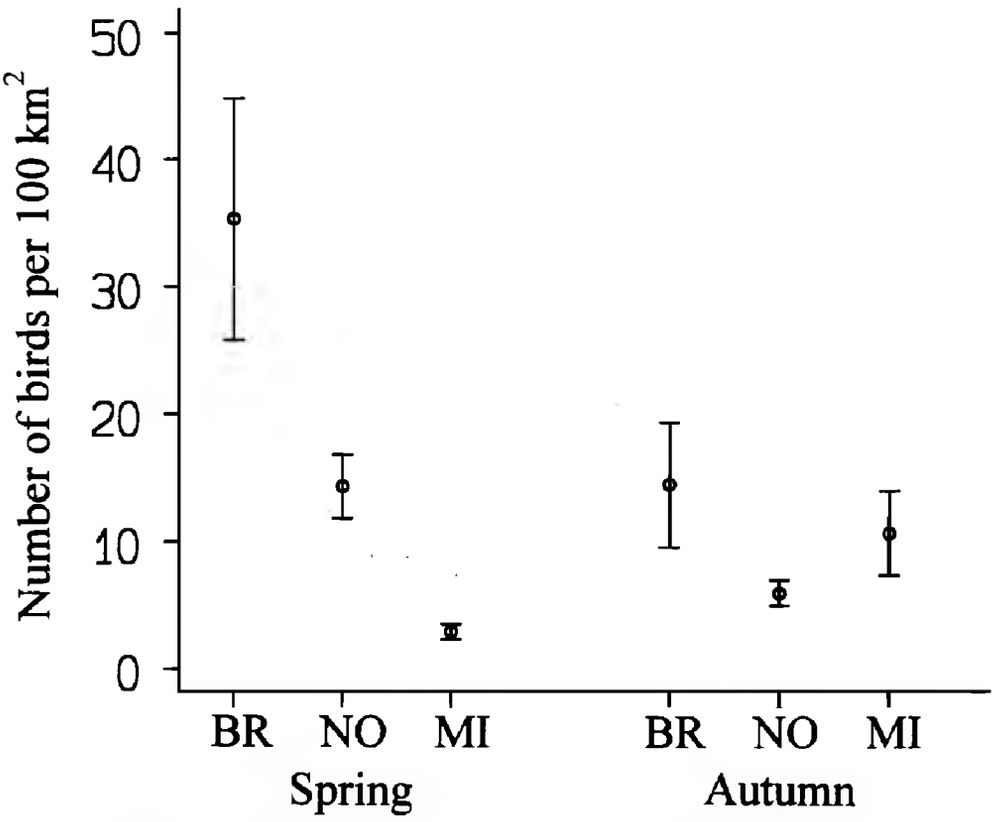

Figure 2. Estimated densities (mean ± standard error) of breeding residents (BR), nonbreeding residents (NO), and migrants (MI) with respect to season. Sample sizes during spring and autumn were 145 and 144 transects, respectively.

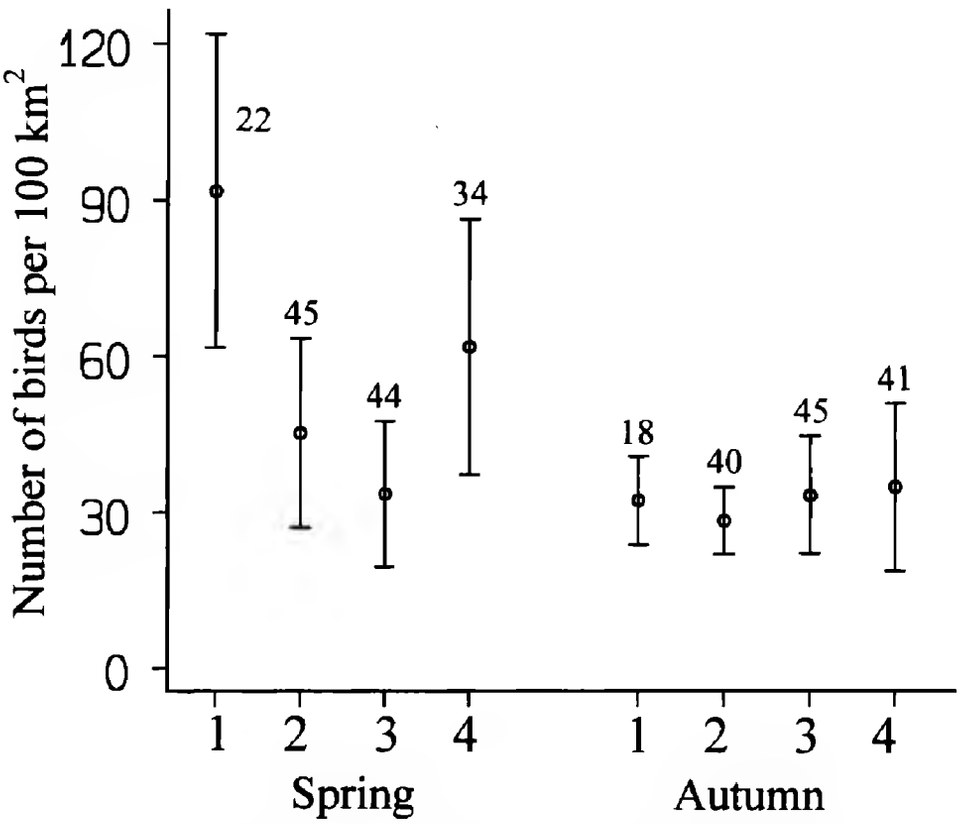

Figure 3. Estimated densities (mean ± SE) of seabirds with respect to distance from Hawaii (see Figure 1 for locations of zones). Numbers accompanying each error bar are sample sizes (number of transects).

Predominant Species

Predominant species (corrected counts > 15 birds, Table 2) were, in order of decreasing abundance, the Sooty Tern, Wedge-tailed and Sooty shearwaters, Black-winged and Bulwer's petrels, Leach's Storm-Petrel, Juan Fernandez, Mottled, White-necked, and Dark-rumped petrels, White Tern, and Newell's Shearwater.

During spring, the Sooty Tern was the most abundant species in all zones except zone 2, where it ranked second, and the Wedge-tailed Shearwater was second most abundant in all zones except 2, where it ranked first (Table 3). The Leach's Storm-Petrel and Bulwer's Petrel were third and fourth most abundant in zones 1 and 2, and the Black-winged and Juan Fernandez petrels ranked among the five most abundant species in zones 3 and 4.

During autumn, the Sooty Tern ranked among the two most abundant species in zones 2 and 4, the Wedge-tailed Shearwater in zones 1 and 3, and the Mottled Petrel in zones 1 and 2 (Table 3). The Black-winged Petrel was second to fourth most abundant in all four zones, and the Sooty Shearwater was variably abundant in all four zones during each season except spring, when its density was <1 bird per 100 km^2 in zone 4.

Breeding Residents: Predominant Species

Sooty Tern. A very abundant breeder throughout the tropical Pacific (Harrison 1983) and the most abundant seabird breeding on the Hawaiian Islands (Harrison 1990). Harrison (1990) estimated that a minimum of 975,750 pairs breed on the northwestern Hawaiian Islands (i.e., islands west of Kauai or 160° W), 70,000 on the main islands. Egg laying from March to July, fledging to late October.

As did the POBSP, we found the Sooty Tern the most abundant species during both spring and autumn (Table 4). Densities were significantly higher during spring than in autumn, a difference due mostly to high densities in June and especially in May (Figure 4). The POBSP also observed peak numbers in May.

A significant interaction between the effects of distance from Hawaii and season reflected a significant decline in densities of Sooty Terns with distance during spring, compared to a significant increase with distance during autumn (Table 5). This difference resulted primarily from the very high densities in zone 1 during spring, in marked contrast to autumn, when these terns where not seen in zone 1 and their densities peaked in zone 4 (Figure 5). A quadratic effect of distance in both spring and autumn (Table 5) resulted from stable, low densities in zones 2 and 3, compared to higher densities in zones 1 and 4 (spring) or higher densities only in zone 4 (autumn; Figure 5). Densities decreased with increase in water temperature (Table 6).

Adults composed 90% of the 54 Sooty Terns whose age we recorded during spring, 86% of 28 birds in autumn. In spring and autumn, 66% of 143 birds and 55% of 89, respectively, were feeding. Of these, 95% (137) were feeding in flocks capturing prey forced to the surface by tuna (*Thunnus* spp.; hereafter "feeding over tuna"); seven were solitary.

Table 3 Relative Abundance of More Common Seabirds[a] by Distance From Hawaii

	Spring		Autumn	
Rank	Species	Estimated density[b]	Species	Estimated density
Zone 1 (0–73 km offshore)				
1	Sooty Tern	32.7	Wedge-tailed Shearwater	17.0
2	Wedge-tailed Shearwater	22.9	Mottled Petrel	6.3
3	Bulwer's Petrel	18.6	Sooty Shearwater	6.1
4	Leach's Storm-Petrel	6.2	Black-winged Petrel	1.3
5	White-tailed Tropicbird	2.2	White-tailed Tropicbird	1.2
6	Dark-rumped Petrel	2.0		
7	Black-winged Petrel	1.6		
8	Newell's Shearwater	1.1		
9	Sooty Shearwater	1.0		
Zone 2 (74–172 km offshore)				
1	Wedge-tailed Shearwater	14.4	Mottled Petrel	6.4
2	Sooty Tern	11.2	Sooty Tern	5.8
3	Leach's Storm-Petrel	8.1	Black-winged Petrel	4.4
4	Bulwer's Petrel	3.5	Wedge-tailed Shearwater	3.1
5	Sooty Shearwater	2.5	Sooty Shearwater	2.6
6	Black-winged Petrel	1.9	White Tern	1.4
7			Dark-rumped Petrel	1.0
Zone 3 (173–271 km offshore)				
1	Sooty Tern	7.3	Sooty Shearwater	16.7
2	Wedge-tailed Shearwater	6.2	Wedge-tailed Shearwater	5.7
3	Black-winged Petrel	3.7	Black-winged Petrel	4.6
4	Juan Fernandez Petrel	2.9	Sooty Tern	2.4
5	Sooty Shearwater	2.9		
6	Newell's Shearwater	2.9		
7	Bulwer's Petrel	2.1		
8	Pomarine Jaeger	1.9		
9	Leach's Storm-Petrel	1.2		
10	Parasitic Jaeger	1.0		
Zone 4 (272–370 km offshore)				
1	Sooty Tern	13.7	Sooty Tern	18.5
2	Wedge-tailed Shearwater	10.6	Black-winged Petrel	4.9
3	Juan Fernandez Petrel	7.7	Dark-rumped Petrel	2.4
4	White-necked Petrel	7.4	White Tern	2.2
5	Black-winged Petrel	4.5	Juan Fernandez Petrel	2.0
6	Bulwer's Petrel	4.5	Wedge-tailed Shearwater	1.6
7	Newell's Shearwater	2.2	Sooty Shearwater	1.0
8	Pomarine Jaeger	2.1		
9	White Tern	2.1		
10	Dark-rumped Petrel	1.5		
11	Pycroft's Petrel	1.5		
12	Leach's Storm-Petrel	1.2		

[a]Estimated density ≥ 1 bird per 100 km^2.

[b]Birds per 100 km^2, extrapolated after correction for ship speed and direction and species' average flight speed and direction.

Table 4 Estimated Densities with Standard Errors of Predominant Species by Residence Status and Season

Species	Density[c] Spring	Density[c] Autumn	P^a
Breeding residents			
Sooty Tern	13.8 ± 4.67	7.7 ± 3.93	0.005[b]
Wedge-tailed Shearwater	11.7 ± 5.06	5.2 ± 1.50	0.1
Bulwer's Petrel	5.6 ± 1.39	0.0	0.001[b]
Dark-rumped Petrel	0.8 ± 0.43	1.1 ± 0.34	0.06
White Tern	0.6 ± 0.51	1.0 ± 0.68	0.5
Newell's Shearwater	1.7 ± 0.58	0.1 ± 0.08	0.001[b]
Nonbreeding residents			
Black-winged Petrel	3.0 ± 0.96	4.2 ± 0.88	0.008[b]
Leach's Storm-Petrel	4.1 ± 1.07	0.5 ± 0.23	0.001[b]
Juan Fernandez Petrel	2.7 ± 0.91	0.8 ± 0.33	0.02[b]
White-necked Petrel	1.9 ± 0.96	0.0	0.001[b]
Migrants			
Sooty Shearwater	2.0 ± 0.52	7.0 ± 2.83	0.01[b]
Mottled Petrel	0.1 ± 0.08	2.7 ± 1.05	0.001[b]

[a]Probabilities from a t test comparing the difference in densities (log-transformed) between seasons. Sample sizes (number of transects) were 145 in spring and 144 in autumn.

[b]Difference between seasons significant at $P \leq 0.02$.

[c]Birds per 100km^2.

Wedge-tailed Shearwater. Breeds in subtropical to temperate waters throughout the Pacific Ocean (Harrison 1983, Everett and Pitman 1993). Berger (1972) estimated that 98% of the Wedge-tailed Shearwaters breeding on the Hawaiian Islands are of the light phase. Most dark-phase birds breed in the southern hemisphere (Warham 1990). Harrison (1990) estimated that a minimum of 176,575 pairs breed on the northwest Hawaiian Islands, 38,165 pairs on the main islands. Egg laying in mid-June, fledging in November.

This was the second and third most abundant species during spring and autumn, respectively (Table 4). There was an insignificant tendency for densities to be greater during spring than autumn. As found by the POBSP, abundance peaked during May (Figure 4).

Densities decreased significantly with distance from Hawaii Island; the effect differed little between spring and autumn (Table 5, Figure 5). There was a quadratic effect of distance. In spring, this resulted from a gradual decline in density from zone 1 to 3, followed by an increase in zone 4. In autumn, density declined abruptly from zone 1 to 2, then stabilized in zones 2 to 4. Abundance increased with decrease in wind speed (Table 5) and increase in water salinity (Table 6).

The proportion of dark-phase birds was 7.8% of 115 in spring, 5.0% of 60 birds in autumn; the difference was insignificant ($G = 0.51$, df = 1, $P =$

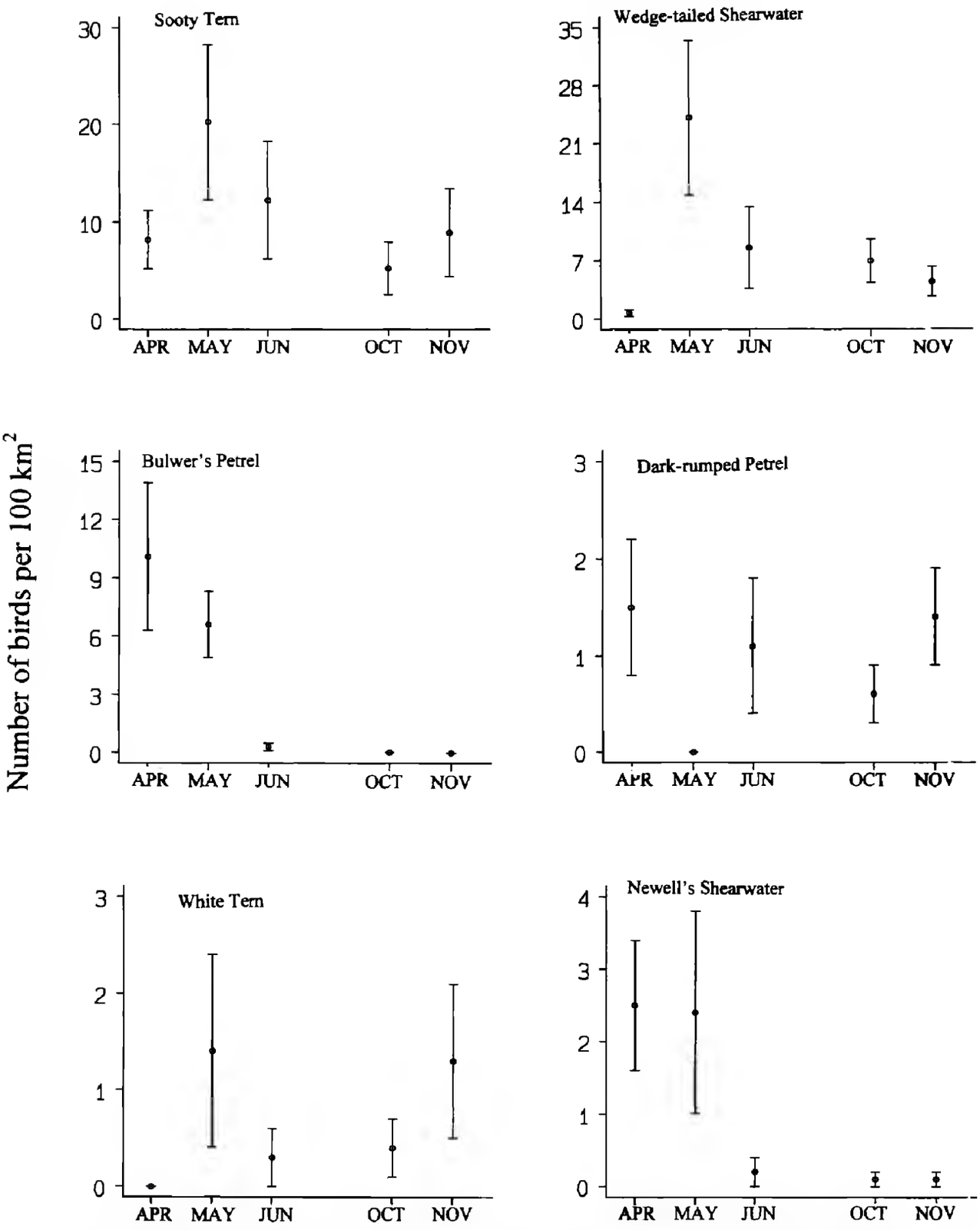

Figure 4. Densities (mean ± standard error) by month of predominant species of seabirds breeding on the Hawaiian Islands. Sample sizes (number of transects) for each month were 45, 52, 48, 45, and 99, respectively.

0.5). In contrast, the POBSP observed 17.1% (n = 6640 birds) dark phase during spring, a proportion significantly greater than ours in spring (G = 8.28, P = 0.005) and a proportion significantly greater than theirs in autumn (3.3%, n = 421 birds; G = 75.81, $P < 0.001$).

Table 5 Multiple-Regression Analyses of Relaionships between Estimated Bird Density[a] and Distance from Hawaii and Wind Speed[b]

		Seasons combined		Spring		Autumn		
	Distance × season[c]	Distance	Distance^{2d}	Distance	Distance^2	Distance	Distance^2	Wind speed
Breeding residents								
Sooty Tern	0.003	—	—	(–)[e] 0.002[f]	(+) 0.01	(+) 0.02	(+) 0.02	ns[g]
Wedge-tailed Shearwater	ns	(–) 0.001	(+) <0.001	—	—	—	—	(–) 0.01
Bulwer's Petrel	0.001	—	—	(–) 0.01	(+) 0.001	—	—	ns
Dark-rumped Petrel	0.02	—	—	ns	ns	(+) 0.02	ns	ns
White Tern	ns	ns	ns	—	—	—	—	ns
Newell's Shearwater	ns	(+) 0.01	ns	—	—	—	—	(+) 0.02
Non-breeding residents								
Black-winged Petrel	ns	(+) 0.001	ns	—	—	—	—	ns
Leach's Storm-Petrel	0.01	—	—	(–) 0.01	(–) 0.001	ns	ns	(+) 0.001
Juan Fernandez Petrel	0.007	—	—	(+) 0.001	ns	ns	ns	ns
White-necked Petrel	0.003	—	—	(+) 0.001	ns	—	ns	ns
Migrants								
Sooty Shearwater	ns	ns	ns	—	—	—	—	(–) 0.001
Mottled Petrel	0.001	—	—	ns	ns	(–) 0.001	ns	(–) 0.001

[a]Transformed as log(birds/100 km^2). The sample size for each species was 289 transects.

[b]Wind speed and distance from land analyzed as continuous variables.

[c]Interaction between the two terms in the effect on density.

[d]Squared terms denote quadratic effects (no quadratic effects of wind speed were significant).

[e]Signs given in parentheses denote signs of the regression coefficient, i.e., a positive or negative slope. A negative slope indicates higher densities nearer Hawaii; a positive slope indicates higher densities farther from Hawaii.

[f]Values following coefficients are P values; significance accepted at $P \leq 0.02$.

[g]ns, not significant.

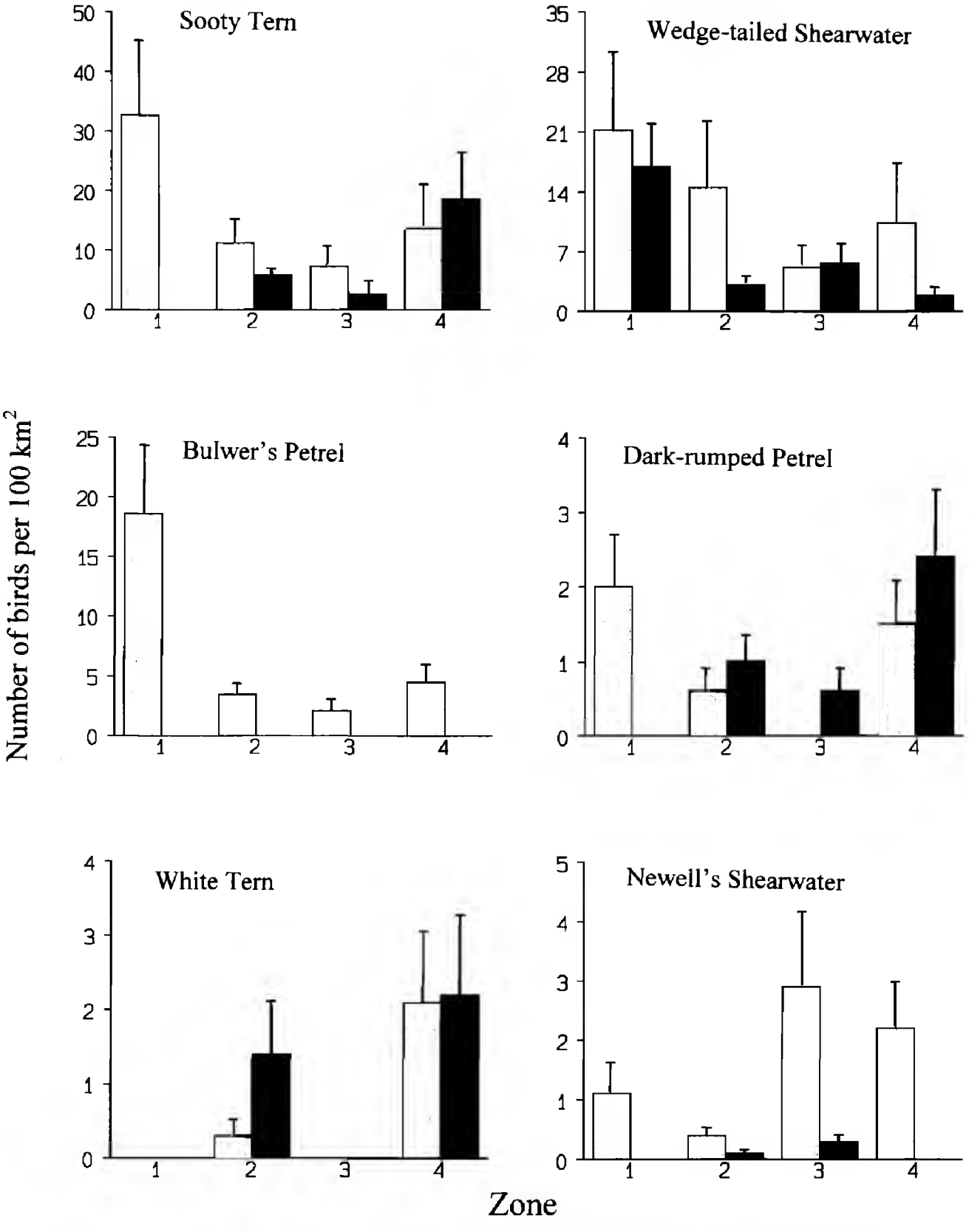

Figure 5. Densities (mean ± standard error) by season and zone of predominant species of seabirds breeding on the Hawaiian Islands. Light bars, spring; dark bars, autumn. Lines above the bars are standard errors. See Figure 1 for location of zones, Figure 3 for sample sizes.

Table 6 Regression Analyses of Relationships between Estimated Bird Density[a] and Oceanographic Variables[b]

	SST	SST²[c]	SAL	TDPT	TDPT²	TSLP	TSLP²
Breeding residents							
Sooty Tern	(–)[d] 0.02[e]	ns[f]	ns	ns	ns	ns	ns
Wedge-tailed Shearwater	ns	ns	(+) 0.01	ns	ns	ns	ns
Bulwer's Petrel	(–) 0.001	ns	(–) 0.001	(+) 0.002	ns	(–) 0.005	ns
Dark-rumped Petrel	ns	ns	ns	(–) 0.003	ns	ns	ns
White Tern	ns	ns	ns	ns	ns	ns	ns
Newell's Shearwater	(–) 0.001	ns	(–) 0.02	ns	ns	ns	ns
Nonbreeding residents							
Black-winged Petrel	(+) 0.001	ns	(+) 0.02	(–) 0.001	(+) 0.01	ns	ns
Leach's Storm-Petrel	(–) 0.001	ns	(–) 0.001	ns	ns	ns	ns
Juan Fernandez Petrel	ns	(–) 0.05	ns	(–) 0.001	(+) 0.001	(–) 0.003	ns
White-necked Petrel	ns	ns	ns	(–) 0.001	(+) 0.001	(–) 0.001	(+) 0.002
Migrants							
Sooty Shearwater	ns	ns	ns	ns	ns	(–) 0.01	ns
Mottled Petrel	ns	ns	(+) 0.01	ns	ns	ns	ns

[a]Transformed as log(birds/100km²). The sample size for each species was 289 transects.

[b]SST, sea-surface temperature; SAL, sea-surface salinity; TDPT, thermocline depth; TSLP, thermocline slope. All independent terms analyzed as continuous variables.

[c]Squared terms denote quadratic effects (no quadratic effects for salinity).

[d]Signs given in parentheses denote signs of the regression coefficient, i.e., a positive or negative slope. A positive slope indicates an increase in density with increase in value of the variable.

[e]Values following coefficients are *P* values; significance accepted at $P \leq 0.02$.

[f]ns, not significant.

During spring and autumn, 83% of 95 birds and 23% of 14, respectively, were feeding. Of the 109 feeding birds, 97% were in flocks feeding over tuna, 3% were scavenging squid.

Bulwer's Petrel. Breeds throughout the tropical Pacific (Harrison 1983). Harrison (1990) estimated that a minimum of 76,555 pairs breed on the northwestern Hawaiian Islands, 335 pairs on the main islands. Egg laying from late May to early June, fledging in September.

Like the POBSP, we observed Bulwer's Petrel only during spring, when it was the third most abundant species (Table 4). We observed peak densities in June (Figure 4), the POBSP in May.

Densities of Bulwer's Petrels decreased with increase in distance from Hawaii (Table 5, Figure 5). A quadratic effect of distance resulted from an abrupt decline in density from zone 1 to 2, then stabilization in zones 2 to 4. Densities increased with decrease in water temperature, salinity, and thermocline slope and with increase in thermocline depth (Table 6).

Of the 49 birds, 11 were feeding. Eight were solitary and three were in a feeding flock.

Dark-rumped Petrel. An endemic taxon, with an estimated 3750 to 4500 pairs breeding at high elevations on the main Hawaiian Islands (Spear

et al. 1995). Egg laying in early May, fledging in October and November (Simons 1985, Ainley et al. 1995).

This was the sixth most abundant species during autumn (Table 4); between the two seasons densities differed insignificantly. We observed highest densities in April (Figure 4); the POBSP counted highest numbers in May.

In spring, densities were significantly higher in zone 1 than in zones 2 and 3. In autumn, densities were significantly higher in zone 4 than in zones 1, 2, or 3 (Sidak tests, $P < 0.02$, Figure 5). Density decreased with increase in thermocline depth (Table 6).

Seven of the 25 petrels were feeding. Five were in flocks feeding over tuna; two were feeding over tuna but were not in a flock.

White Tern. Relatively small populations breed on islands throughout the tropical Pacific (Harrison 1983). Harrison (1990) estimated that 7445 pairs breed on the northwestern Hawaiian Islands, 50 pairs on Oahu. On Oahu the breeding season is protracted and varies much from year to year (Berger 1972, Miles 1986).

This was the seventh most abundant species during autumn (Table 4). Densities differed insignificantly by season and month (Table 4; Sidak tests for monthly comparisons, all $P > 0.02$, Figure 4). The POBSP likewise recorded similar numbers throughout the year.

These terns were seen only in zones 2 and 4 (Figure 5). There were no relationships between densities and distance from Hawaii or oceanographic variables (Tables 4 and 5). Of the 19 terns recorded, 52% were feeding. Nine were feeding in flocks and one was solitary.

Newell's Shearwater. An estimated 18,000 to 19,000 pairs breed on the main Hawaiian Islands (Spear et al. 1995), to which the bird is endemic. Egg laying in late May or early June (Harrison 1990), fledging in October and November (Berger 1972).

This was the ninth most abundant species during spring (Table 4). Densities were significantly higher in spring than in autumn. As did the POBSP, we recorded the majority in April and May (Figure 4).

Densities increased with distance from Hawaii and wind speed (Table 5, Figure 5; see also Spear et al. 1995). Densities also increased with decrease in water temperature and salinity (Table 6).

Four of the 17 birds (24%) were feeding, all in flocks over tuna.

Nonbreeding Residents: Predominant Species

Black-winged Petrel. Breeds in abundance in the temperate South Pacific on islands off New Zealand and Australia (Falla et al. 1967). Egg laying in December and January, fledging in late April.

This was the fifth and fourth most abundant species during spring and autumn, respectively (Table 4); densities were significantly higher in autumn. We observed it during each of the five months except April; densities were highest in June (Figure 6). The POBSP observed highest numbers from May to November, with a peak in October.

Densities increased significantly with increase in distance from Hawaii at both seasons (Table 5, Figure 7); densities differed insignificantly by season

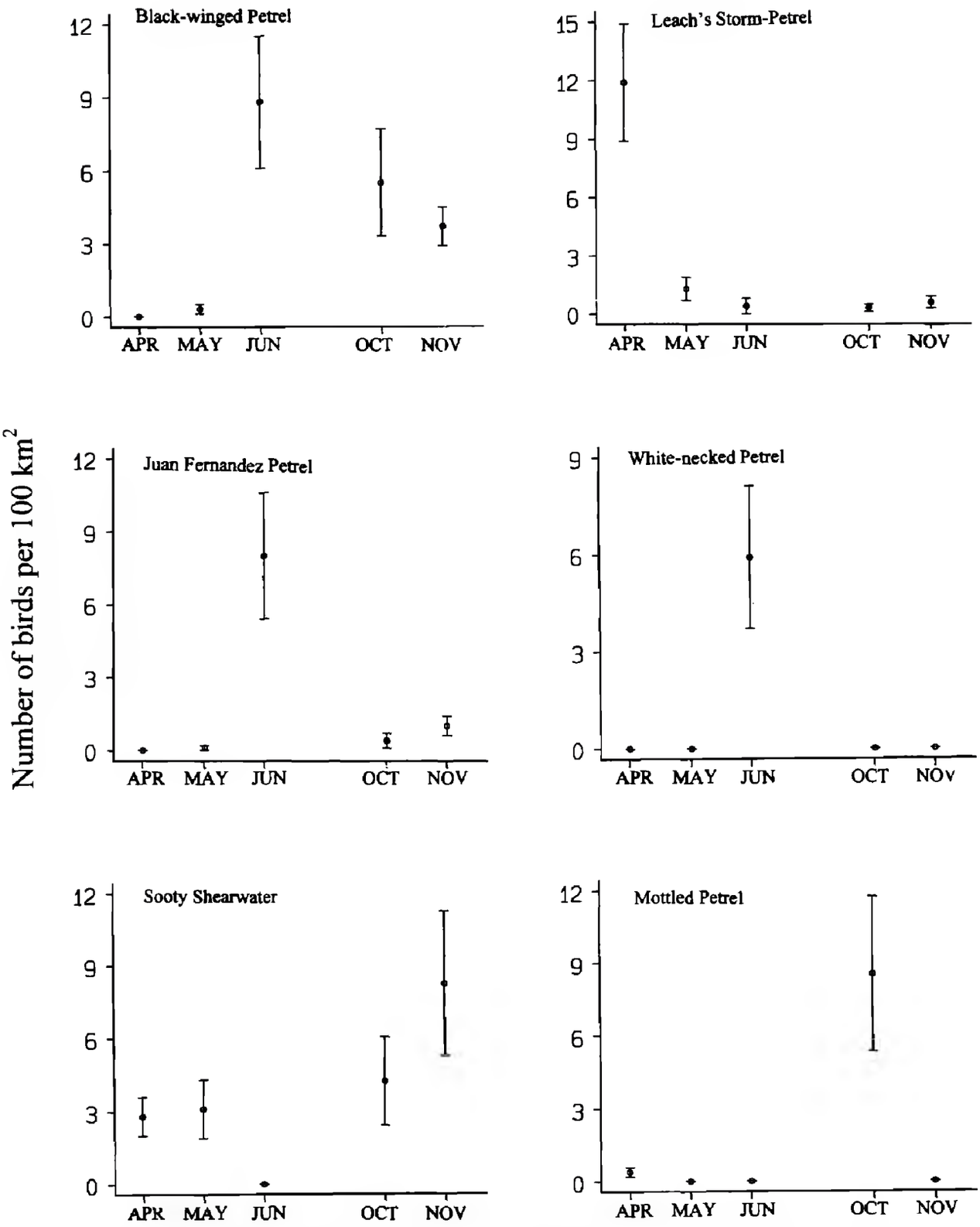

Figure 6. Densities (mean ± standard error) by month of predominant species of seabirds not breeding in the Hawaiian Islands. Sample sizes (number of transects) for each month were 45, 52, 48, 45, and 99, respectively.

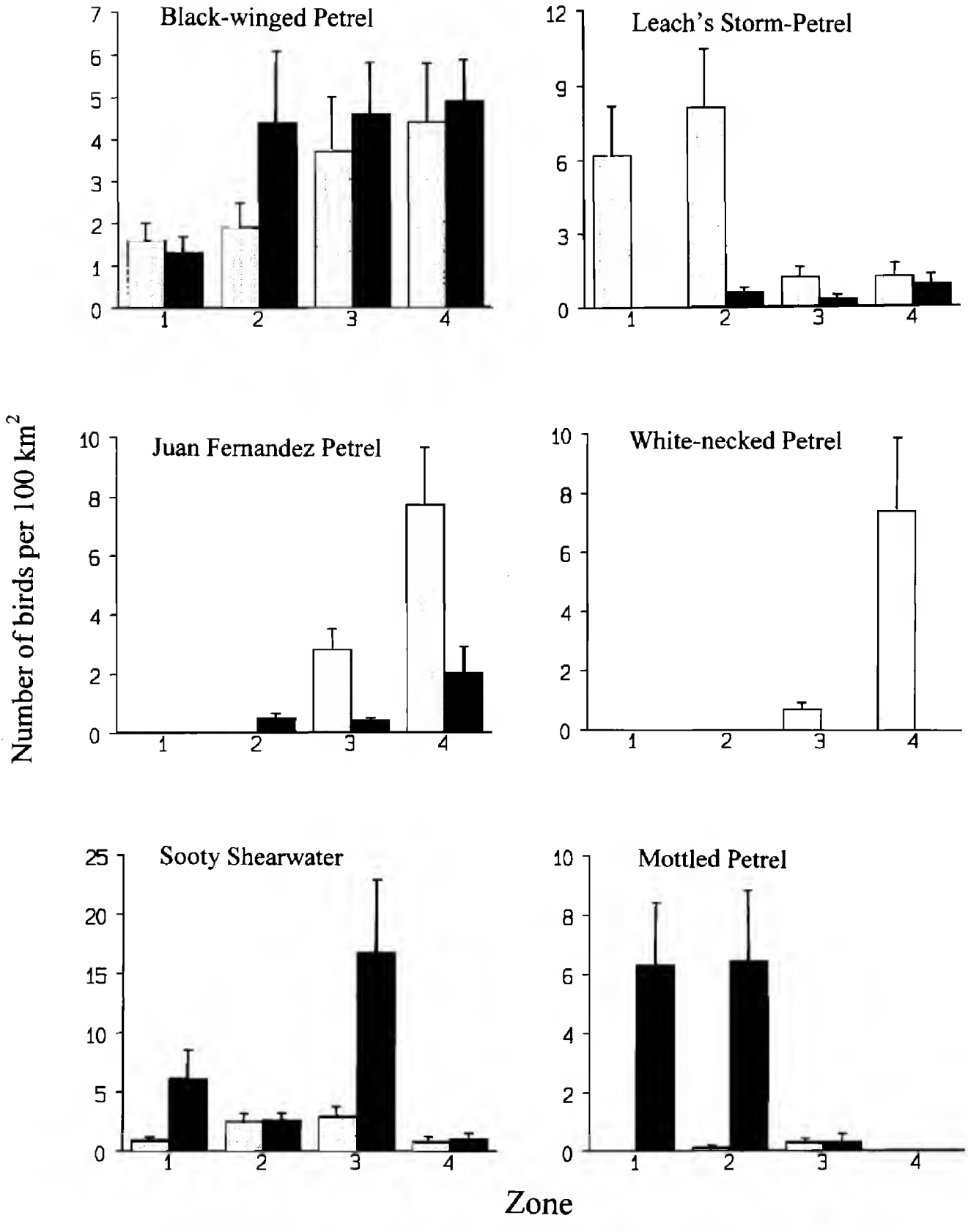

Figure 7. Densities (mean ± standard error) by season and zone of predominant species of seabirds not breeding on the Hawaiian Islands. Light bars, spring; dark bars, autumn. Lines above the bars are standard errors. See Figure 1 for location of zones, Figure 3 for sample sizes.

in each of the four zones (Sidak tests, all $P > 0.02$). Densities increased significantly with increase in water temperature and salinity and with decrease in thermocline depth (Table 6). The effect of thermocline depth was quadratic because of stabilization of density at depths >50 m (Figure 8).

During spring and autumn, 21% of 33 birds and 10% of 49, respectively, were foraging. Of the 12 foraging petrels, five were feeding in flocks over tuna; seven fed alone on the water.

Leach's Storm-Petrel. A very abundant breeder around the North Pacific (Crossin 1974, Ainley 1980); winters throughout the eastern tropical Pacific (Pitman 1986).

This was the fourth most abundant species during spring, when the only species in higher densities were those breeding on the main Hawaiian Islands (Table 4). Densities of these storm-petrels were significantly higher in spring than autumn. We observed them each month (Figure 6), although densities were highest during April. The POBSP also observed highest numbers in April.

A significant interaction between the effects of distance from Hawaii and season on density was due to a significant decrease in density with increase in distance during spring, compared to an insignificant effect of distance during autumn (Table 5, Figure 7). During spring, most of these petrels occurred in zones 1 and 2. A cubic effect of distance in spring ($P < 0.02$) resulted from stabilization of density in zones 1 and 2, followed by an abrupt decline in zone 3 and stabilization in 4. Densities increased with increase in wind speed (Table 5) and decrease in water temperature and salinity (Table 6).

Of the 41 birds recorded, 31% were feeding, all alone. In spring, flight direction was mostly northwest to north (75%).

Juan Fernandez Petrel. An estimated 1 million pairs breed on Mas Afuera Island, Chile; egg laying in late December and early January (Brooke 1987). Fledging is probably in May, if the chicks develop like those of the closely related Dark-rumped Petrel (Harris 1970).

This was the sixth most abundant species during spring (Table 4). Densities were higher in spring than in autumn because of very high densities in June (Figure 6; it was not abundant earlier in the spring). In contrast, the POBSP observed highest numbers in October and about half as many in June.

A significant interaction between the effects of distance from Hawaii and season on density was due to a significant increase in density with increase in distance in spring; during autumn the effect was insignificant (Table 5, Figure 7). In spring, densities were significantly higher in zone 4 than in other zones (Sidak tests, all $P < 0.02$, Figure 7). These petrels were not seen in zone 2 in spring or in zone 1 at either season.

Densities increased significantly with decrease in thermocline depth and slope (Table 6). A quadratic effect of water temperature was due to higher densities at temperatures of 26° to 27°C and lower densities at temperatures of 24° and 28°C (Figure 8). A quadratic effect of thermocline depth reflected a drop in density at depths greater than 50 m, followed by density stabilization at greater thermocline depths.

Of the 40 birds recorded, 43% were foraging. Of the 17 feeding birds, 15 (88%) were in flocks feeding over tuna, and two were scavenging squid.

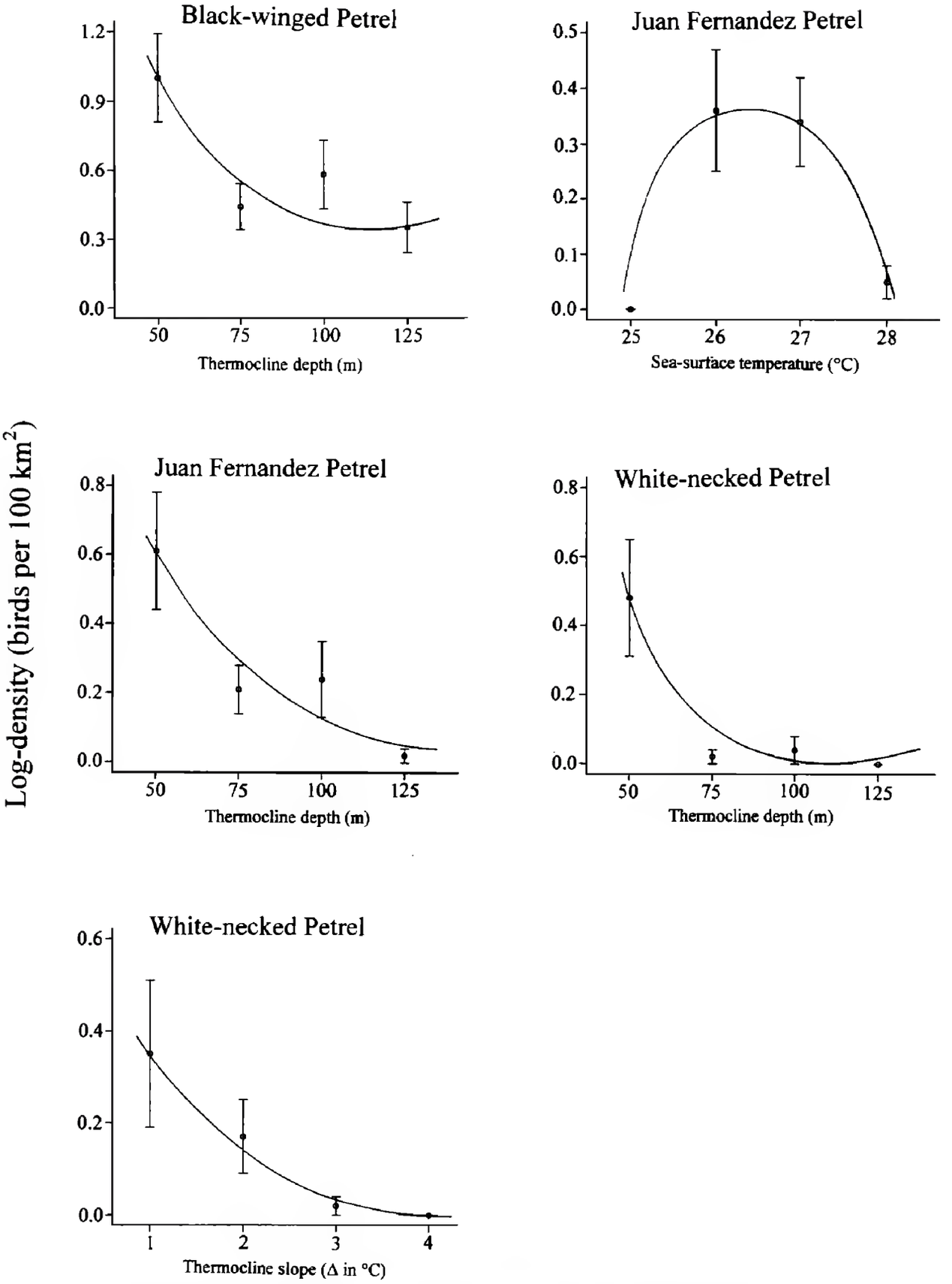

Figure 8. Results of multiple-regression analyses for density of seabirds (log-transformed) with oceanographic variables having a nonlinear effect. Shown are the means of seabird density (log-transformed) ± one standard error (vertical lines). Samples sizes for sea-surface temperature, from left to right, were 62, 89, 103, and 35, for thermocline depth 51, 109, 54, 75, for thermocline slope 40, 74, 114, 61.

White-necked Petrel. An estimated 50,000 pairs breed on Macauley Island, north of New Zealand (Tennyson et al. 1989), on a schedule similar to that of the Juan Fernandez Petrel (Falla et al. 1967, Brooke 1987). A major wintering area of these petrels is in the transition zone of the western North Pacific (Tanaka and Inaba 1977, Pyle and Eilerts 1986).

All sightings occurred during spring (only in June), when this was the eighth most abundant species (Table 4, Figure 6). We saw them only during La Niña in 1988 and in 1989 (13.1 and 0.4 birds per 100 km^2, respectively). We do not compare our results for this species with those of the POBSP because the latter sometimes combined counts of White-necked and Juan Fernandez petrels (King 1970; see Spear et al. 1992b for identification problems).

Densities increased with increase in distance from Hawaii (Table 5, Figure 7); most birds were seen in zone 4. This species' densities increased with decrease in thermocline depth and slope (Table 6). A quadratic effect of thermocline depth was due to a marked drop in density at depths >50 m, followed by density stabilization (Figure 8). Similarly, a quadratic effect of thermocline slope reflected a gradual drop to very a low density with increase in slope to 3°, followed by leveling of density at slopes of 4° (Figure 8). One of the 23 birds recorded was in a flock feeding over tuna.

Migrants: Predominant Species

Sooty Shearwater. Millions breed on islands off southern New Zealand and Chile; many winter in the North Pacific (Everett and Pitman 1993, Warham and Wilson 1982) and Peru Current (Murphy 1936). Eggs are laid from mid-November to early December; fledging is in late May and early June.

This was the seventh and second most abundant species during spring and autumn, respectively (Table 4); densities were significantly higher in autumn. We saw it in each month except June, with peak densities in November (Figure 6). The POBSP had highest counts in April and October.

The seasonal difference in abundance reflected densities in zones 1 and 3 being higher in spring than in autumn (Sidak tests, both $P < 0.002$, Figure 7). In both seasons, density differed insignificantly with distance from Hawaii, although densities in zone 3 were very high in autumn (Table 5, Figure 7). Density decreased with increase in wind speed and thermocline slope (Tables 4 and 5).

During spring and autumn, one of 85 birds and four of 21, respectively, were foraging. Of these, four were in flocks feeding over tuna and one appeared to be scavenging. Flight direction was mostly northwest in spring, and southwest in autumn.

Mottled Petrel. Breeds on islands south of New Zealand. Egg laying in December and January, fledging in May (Warham et al. 1977). Winters in subpolar waters of the North and South Pacific (reviewed in Bartle et al. 1993).

This was the fifth most abundant species during autumn, when densities were significantly higher than in spring (Table 4). We observed 55 in October and three in April (Figure 6). This chronology is similar to that seen by the POBSP, which logged the species in October (50 birds), November (2),

December (2), April (10), and May (1). Our greatest numbers were on 16 October, when we estimated 15.9 birds per 100 km^2; peak counts by the POBSP were on 18 October.

Densities decreased with increase in distance from Hawaii in spring, but there was little effect of distance in autumn (Table 5, Figure 7). Nearly all birds were seen in zones 1 and 2, southeast of Hawaii Island, where densities were significantly higher than in zones 3 and 4. Densities decreased with increase in wind speed (Table 5) and water salinity (Table 6). We saw none feeding. Flight direction was southwest to southeast in autumn and north in spring.

Breeding Residents: Non-Predominant Species

Our counts of the following species were too low for distributional analysis (see Table 2). Numbers in parentheses are Harrison's (1990) estimated minima of pairs breeding on the northwestern and main Hawaiian Islands, respectively: Black-footed Albatross (36,260; 0); Christmas Shearwater (2245; 40), Harcourt's Storm-Petrel (<100 on Kauai; unknown number on Hawaii), White-tailed Tropicbird (0; 890), Red-tailed Tropicbird (8760; 92), Red-footed Booby (4540; 1100), Great Frigatebird (8115; 0), Brown Noddy (76,700; 16,005), and Black Noddy (6565; 615). The last we saw only in feeding flocks near Hawaii (see Feeding Flocks).

We identified two Harcourt's Storm-Petrels, one each at 18° 28' N, 155° 47' W, 50 km off Hawaii on 21 April 1990, the other at 18° 25' N, 155° 27' W, 65 km off Hawaii, on 18 April 1991. We distinguished the species from Leach's by its more square (less forked) tail, darker color, narrower band-shaped sharply demarcated white rump-patch. The difference from the V-shaped rump patch of the Leach's is best seen through a 20× binocular when the bird is flying directly away. In addition, Harcourt's usually fly with wings angled back towards the tail more so than do Leach's.

Nonbreeding Residents: Non-Predominant Species

Kermadec Petrel. Breeds in the South Pacific with a prolonged or year-round breeding season (Murphy and Pennoyer 1952). We observed it in June (4 birds) and November (4; for identification criteria see Herald and Murphy's petrels). The POBSP recorded 76 Kermadec Petrels; numbers were greatest from June to January. The POBSP recorded the light morph more often than the dark. In June, we saw three dark morphs and one intermediate; in November all were light. Kermadec Petrels were seen in zones 2 (2 birds) and 3 (6 birds). Three of the eight birds were in a feeding flock foraging over small tuna.

Herald Petrel. Breeds in the South Pacific with a prolonged or year-round breeding season (Murphy and Pennoyer 1952, Pyle et al. 1990). On the basis of molecular evidence and assortative mating between the light and dark morphs, Brooke and Rowe (1996) split them, recognizing the light-bellied morph as the Herald Petrel (*P. heraldica*), the dark-bellied birds as the Henderson Petrel (*P. atrata*), both distinct from the polymorphic form breeding on South Trinidad in the Atlantic Ocean and Round Island in the Indian Ocean (*P. arminjoniana*).

We saw three Herald Petrels at 16° 40′ N, 154° 08′ W, at 16° 53′ N, 154° 19′ W, and at 15° 56′ N, 154° 28′ W on 12 November 1990 (first two petrels) and 15 November 1991. The birds were 311, 281, and 364 km, respectively, from Hawaii. We distinguished them from the light-morph Kermadec Petrel by the lack of white primary shafts on the dorsal surface and the longer, wedge shaped tail, differing from the short, square tail of the Kermadec. These birds had indistinct M-patterns on the upper surface of the wings and back, a feature absent in the Kermadec Petrel. The Herald Petrels also had a slimmer appearance than the Kermadec. Relative to body size, they had longer, more slender wings (see Spear and Ainley 1998) and a less robust body.

The POBSP may have seen it but confused it with other similar species, and color morph was not reported. Gould (1971) stated that this species was an "uncommon, winter, nonbreeding visitor," but did not give identification criteria or report color. Finally, Amerson (1971) reported a specimen in the U.S. National Museum (USNM 543342) collected by R. B. Clapp, 14 March 1968, as it flew over Tern Island in the northwestern Hawaiian Islands (this is the only record listed by the AOU 1983), but did not report color. To further confound the problem, the USNM specimen was, as we write this, unavailable for examination because of museum remodeling.

Tahiti Petrel. Breeds on islands in the tropical South Pacific (Harrison 1983). The POBSP observed 12 birds identified as Tahiti or Phoenix (*P. alba*) petrels, and Gould (1971) reported one Tahiti Petrel but gave no identification criteria. The AOU (1983; Appendix A) lists the Tahiti under "sight records" based on information from W. B. King (no reference given) for a bird reported from Hawaiian waters in 1964, but identification criteria are not available.

The Tahiti and Phoenix petrels can be distinguished by bill size and pronounced differences in the wing profile of flying birds (Spear et al. 1992b). Many Tahiti Petrels also have a light rump contrasting with the darker back and tail, a feature absent in the Phoenix.

We recorded two sightings of the Tahiti Petrel on 5 November 1984, at 18° 25′ N, 159° 22′ W and 18° 37′ N, 159° 16′ W, 244 and 233 km from Hawaii, respectively. The first petrel was headed north, the second south. The interval between the two sightings was 1 hr, so there is a reasonable chance that these sightings were of the same bird.

Pycroft's Petrel. Breeds in relatively low numbers on islands off northern New Zealand (Dunned 1985). Egg laying in November and December, fledging in May.

This petrel had not been recorded away from the breeding grounds before our study (Spear et. al. 1992b, Howell et al. 1996). We collected a specimen on 2 May 1987 (Los Angeles County Museum [LACM] 103973) on the equator, 125° W, followed by four more between 1988 and 1991 (LACM 104342, USNM 597200, 597201, and 597202). A bird collected at 9° 00′ N, 140° 00′ W, was about 750 km from the study area. We collected no seabirds in Hawaiian waters. The POBSP recorded no Pycroft's Petrels despite extensive collecting in the central Pacific, but Gould and Piatt (1993) reported sightings (without identification criteria) from north of the Hawaiian

Islands in the transition zone (32° to 43° N) of the central North Pacific.

This petrel is regular in the eastern tropical Pacific (Spear et al. 1992b, Spear and Ainley unpubl. data). A possible reason for the lack of prior records is confusion of this species with Cook's (*P. cooki*) and Stejneger's petrels, which also occur in the eastern tropical Pacific (Spear et al. 1992b). Cook's Petrels occur between 125° and 150° W in autumn during migration to their New Zealand breeding grounds. We have not recorded them there during spring. At sea, the more extensively gray hind neck of Pycroft's Petrel separates it from Cook's (Howell et al. 1996); i.e., Cook's Petrels show appreciably more white in the "face." Pycroft's is smaller with shorter wings and longer tail, relative to body size, than Cook's (Spear et al. 1992b). The lighter gray crown and nape of Pycroft's Petrel distinguish it from Stejneger's Petrel, in which these features are sooty gray (see Spear et al. 1992b, Howell et al. 1996). Nevertheless, the last difference may not be apparent in poor light. This, in combination with the nearly identical body size and shape of Stejneger's and Pycroft's, make these two species the more likely of the trio to be confused in such conditions (Spear and S. N. G. Howell pers. obs.).

We sighted five Pycroft's Petrels, all in June and only during La Niña of 1988 and in 1989. On 19 June 1988, we saw three Pycroft's Petrels at 16° 45′ N, 153° 22′ W, at 16° 50′ N, 153° 27′ W, and at 16° 56′ N, 153° 34′ W, about 330 to 350 km from Hawaii. On 27 June 1989, we saw two at 15° 42′ N, 154° 17′ W and 17° 17′ N, 154° 43′ W, 361 and 230 km from Hawaii. One of the Pycroft's Petrels was feeding in a flock over small tuna.

In June 1986, we observed two Pycroft's/Cook's Petrels that, in retrospect, were probably Pycroft's. Pyle and Eilerts (1986) reported Cook's Petrels around the northwestern Hawaiian Islands that also may have been Pycroft's.

Pomarine Jaeger. These jaegers breed in the Arctic (Furness 1987) but are present in the eastern tropical Pacific throughout the year, most abundantly in winter (Spear and Ainley 1993).

Eight of nine birds were seen in spring, the other in autumn. We observed them in April (3 birds), May (5), and October (1). Spring birds comprised six adults (five light-phase, one dark) and two light-phase subadults; the autumn bird was a light-phase subadult. These birds were seen in zones 1 (2 birds), 2 (2), 3 (4), and 4 (1). Two were in a flock feeding over tuna. In spring, flight direction was northwest to northeast. The POBSP noted a similar pattern, and that most birds wintering in Hawaiian waters were within 50 km of land.

Parasitic Jaeger. Breeds in the Arctic (Furness 1987). Wintering chronology in the eastern tropical Pacific is similar to that of the Pomarine Jaeger (Spear and Ainley 1993, unpubl. data).

This species had not been recorded in Hawaiian waters. We recorded two, a dark-phase subadult (second or third year) on 27 June 1989, at 16° 36′N, 154° 32′ W, and a light-phase adult on 12 November 1991, at 16° 46′ N, 154° 13′ W (latter record in Pyle 1992). These were distinguished from the Long-tailed Jaeger (*S. longicaudus*) by the distinctive shape of the central rectrices. We saw three light-phase first-year jaegers on 2 May 1989, at 17° 40′ N, 156° 35′ W, that were either Parasitic or Long-tailed jaegers. All were in flocks feeding over tuna.

South Polar Skua. Breeds in Antarctica from December to April (Ainley et al. 1990) and winters in low numbers throughout the eastern tropical Pacific (Spear and Ainley 1993, unpubl. data).

The POBSP recorded eight skuas, listing them as the Great (*Catharacta skua*). Gould (1983) reported a South Polar Skua in Hawaiian waters at 24° 18′ N, 158° W, in November 1976 but gave no identification criteria. Thus the South Polar Skua was unconfirmed in Hawaiian waters before we sighted and photographed a flying bird on 7 October 1987 at 18° 05′ N, 155° 01′ W (see Pyle 1988). The identification was based on the extensive golden hackles on the nape, a feature absent in the Great Skua and Chilean Skua (*C. chilensis*; Harrison 1983, Furness 1987, Ainley and Spear pers. obs). We suspect that the skuas seen by the POBSP were South Polar Skuas. All skuas that we have identified in the eastern tropical Pacific have been of this species.

Migrants: Non-Predominant Species

Buller's Shearwater. Breeds in New Zealand and winters in the North Pacific (Falla et al. 1967, Wahl 1985). Egg laying in November and December, fledging in April.

We observed four on 13 November 1989 at 17° 54′ N, 154° 53′ W, two sitting on the water and two in a feeding flock. Five earlier records from Hawaiian waters include three sightings by the POBSP in March and April 1964–1965 and two on 3 November 1984 (Pyle and Eilerts 1986).

Murphy's Petrel. Breeds during summer in the subtropical South Pacific (Harrison 1983) and migrates to the North Pacific (Bartle et al. 1993). Four specimens have been collected in Hawaiian waters: Kure Atoll (7 October 1963), French Frigate Shoals (9 September 1966), Kauai (25 November 1986), and at sea 13 km off Oahu (29 October 1966; Gould and King 1967, Clapp 1974, R. L. Pyle; SIGHTINGS Data Base, Bishop Museum, Honolulu). On 27 June 1989 we saw another flying south at 16° 09′ N, 154° 24′ W. The bird lacked white patches on the underside of the forewings and white primary shafts, distinguishing it from Solander's (*P. solandri*) and Kermadec petrels, and was sooty gray with an indistinct M-pattern on the dorsal wings and back, distinguishing it from the uniform darker (nearly black like the Christmas Shearwater) Henderson Petrel (see Herald Petrel).

Stejneger's Petrel. Breeds on Mas Afuera Island, Chile (Brooke 1987) and winters in the northwestern Pacific (Tanaka et al. 1985). Egg laying in December and January (Brooke 1987), fledging in April and May.

This species was recorded on Lanai in 1914, when a partially eaten bird was found (Clapp 1984). Two possible sighting were made in Hawaiian waters in the 1990s (R. L. Pyle, SIGHTINGS Data Base, Bishop Museum, Honolulu). We saw seven: 5 November 1984 (1 bird), 16 October 1985 (3), 30 October 1985 (2), and 18 June 1986 (1), three in zone 2 and two each in zones 3 and 4. The bird seen in June was flying northwest; those in autumn were flying south to southeast. Identification was based on criteria in Spear et al. (1992b); see also Pycroft's Petrel.

Arctic Tern. Breeds in the Arctic and winters in the Antarctic. We observed seven, two on 21 April 1990 and five on 25 April 1991, dates

consistent with observations by the POBSP. None were feeding. Flight direction was northward.

Feeding Flocks

We recorded 16 flocks of seabirds foraging over tuna (Figure 1); the fish were from 0.3 to about 0.6 m in length. Thirteen (81%) of the flocks were seen during spring. Numerically, they were dominated by Sooty Terns (62% of all individuals recorded) and Wedge-tailed Shearwaters (20%; Table 7), i.e., findings similar to those of the POBSP. The species composition of flocks was 92.5% breeding residents, 6.0% nonbreeding residents, and 1.4% migrants.

The ratio of the number of feeding birds to the distance the ship traveled (= survey effort for flocks) for each zone indicated a higher incidence of feeding in zone 4 than in 1, 2, or 3 (*G* tests, all $P < 0.001$, Table 7) and in zones 1 and 2 than in 3 (both $P < 0.010$). The ratio between zones 1 and 2 did not differ ($P = 0.4$). These differences resulted mainly from variation in numbers of Sooty Terns.

The mean number of species per flock differed insignificantly among zones (ANOVA, $P = 0.9$, Table 7), as did the ratio of number of species to survey effort ($G = 3.36$, df = 3, $P = 0.3$). However, of the 17 species recorded, the number recorded in zone 3 (15 species) was over twice that in zones 1 and 4 (7), and 1.7 times higher than in zone 2 (9 species). The differences were mainly due to the presence of four species of nonbreeding resident *Pterodroma* seen feeding only in zone 3. Low numbers of flocks preclude detailed comparisons.

DISCUSSION

Although our survey effort was not extensive (surveys covered 2128.4 km^2 of ocean area on 23 days over eight years), we show that many findings of the POBSP have changed little between 1964–1965 and 1984–1991. We report the first quantitative estimates for these waters of bird abundance based on a rigorous survey protocol and document the occurrence of several species unreported or unconfirmed from Hawaiian waters.

Species Status

Species predominant in southeastern Hawaiian waters and breeding on the Hawaiian Islands, were, in decreasing order of abundance, the Sooty Tern, Wedge-tailed Shearwater, Bulwer's Petrel, Dark-rumped Petrel, White Tern, and Newell's Shearwater. Predominant nonbreeding residents were, in decreasing numerical importance, the Black-winged Petrel, Leach's Storm-Petrel, Juan Fernandez Petrel, and White-necked Petrel. Predominant migrants comprised the Sooty Shearwater and Mottled Petrel.

Our records of the Tahiti, Herald, Pycroft's, and Stejneger's petrels, South Polar Skua, and Parasitic Jaeger, species we classify as nonbreeding residents, are the first records for Hawaiian waters, although a dead Stejneger's Petrel was found on Lanai in 1914 (Clapp 1984) and confirmation of the Herald Petrel collected on French Frigate Shoals in 1968 (USNM 543342;

Table 7 Number of Individuals, Number of Participant Species, and Species Composition of 16 Feeding Flocks, 1984–1991[a]

	Distance from Hawaii									
	Zone 1 (*n* = 2)		Zone 2 (*n* = 4)		Zone 3 (*n* = 7)		Zone 4 (*n* = 3)		All zones (*n* = 16)	
Individuals[b]	38.0 ± 7.1		38.3 ± 16.3		14.4 ± 7.7		101.0 ± 118.9		39.0 ± 50.5	
Species per flock[b]	4.5 ± 2.1		4.0 ± 2.6		4.6 ± 1.1		4.3 ± 2.5		4.4 ± 1.8	
Species composition[c]										
Breeding residents										
Dark-rumped Petrel	2	2.6	0	—	1	1.0	7	2.3	10	1.6
Bulwer's Petrel	0	—	2	1.3	1	1.0	0	—	3	0.5
Wedge-tailed Shearwater	20	26.3	38	25.5	35	35.0	33	10.9	126	20.1
Newell's Shearwater	0	—	19	12.8	1	1.0	0	—	20	3.2
Great Frigatebird	2	2.6	1	0.7	1	1.0	0	—	4	0.6
Sooty Tern	45	59.2	80	53.7	28	28.0	236	78.1	389	61.9
White Tern	3	3.9	1	0.7	8	8.0	15	5.0	27	4.3
Black Noddy	3	3.9	0	—	0	—	0	—	3	0.5
Nonbreeding residents										
Juan Fernandez Petrel	0	—	0	—	8	8.0	8	2.6	16	2.5
White-necked Petrel	0	—	0	—	4	4.0	0	—	4	0.6
Kermadec Petrel	0	—	0	—	4	4.0	0	—	4	0.6
Black-winged Petrel	0	—	0	—	1	1.0	0	—	1	0.2
Pycroft's Petrel	0	—	0	—	1	1.0	0	—	1	0.2
Pomarine Jaeger	1	1.3	2	1.3	1	1.0	1	0.3	5	0.8
Parasitic Jaeger	0	—	0	—	0	—	2	0.7	2	0.5
jaeger spp.	0	—	0	—	3	3.0	0	—	3	0.6
Migrants										
Buller's Shearwater	0	—	4	2.7	0	—	0	—	4	0.6
Sooty Shearwater	0	—	2	1.3	3	3.0	0	—	5	0.8
Total	76	99.8	149	100.0	100	100.0	302	99.9	628	100.1

[a]Zones given with respect to distance from Hawaii (see Figure 1). Values of *n* under zones denote number of feeding flocks.

[b]Mean plus or minus standard deviation.

[c]Number of individuals, followed by percentage of total number of all birds recorded in flocks.

Amerson 1971) awaits re-opening of the specimen collection at the museum. The six species were uncommon (Herald, Pycroft's, and Stejneger's petrels and Parasitic Jaeger) or rare (Tahiti Petrel and South Polar Skua) during our study.

Particularly noteworthy was the Pycroft's Petrel, which is not listed among species occurring in North America (AOU 1983), and the Black-winged Petrel, which was the fourth and fifth most abundant species (and most abundant *Pterodroma*) during spring and autumn, respectively—see King (1970) for similar findings—but which is considered by the AOU (1983) as "accidental" in Hawaiian waters.

During spring, species breeding on the Hawaiian Islands were significantly more abundant in southeastern Hawaiian waters than nonbreeding residents or migrants, and migrants were significantly less abundant than

nonbreeding residents. In autumn, however, abundance differed little among the three groups because of decrease in densities of breeding species, stabilization in densities of nonbreeding residents, and increase in migrants. The decrease in breeders was most marked in the Bulwer's Petrel, which was the third most abundant species during spring but not recorded in autumn [see also King (1970) for similar results].

The marked increase in migrants during autumn was due to southward movement through Hawaiian waters of Sooty Shearwaters and Mottled Petrels. In spring, these birds migrate to the North Pacific from breeding sites near New Zealand, returning in autumn (Warham 1996). The lower number in the study area during spring was likely because these birds' migration routes follow the predominant wind systems (see Spear and Ainley, in press), which move clockwise in the North Pacific. EvidentYy most Sooty Shearwaters and Mottled Petrels migrate north along the western side of the Pacific (west of Hawaii) in spring, move from west to east to the northeastern Pacific in summer, and follow the southwesterly trade winds through the study area in autumn.

The concentration of Mottled Petrels in zones 1 and 2 off the eastern side of Hawaii Island was the highest that we encountered during extensive surveys in the eastern tropical Pacific. We suspect that the Hawaiian Islands disrupt the migration front moving from the north or northeast toward the southwest, deflecting birds southward around the islands. The combined data from our study and the POBSP for the Mottled Petrel suggest a very synchronous migration across Hawaiian waters during early to mid-October. The consistent flight direction of the Sooty Shearwater, Stejneger's Petrel, Arctic Tern, Leach's Storm-Petrel, and Pomarine Jaeger (the latter two classified as nonbreeding residents because of the presence of birds near the Hawaiian Islands in summer; King 1970) also indicate direct migration through Hawaiian waters, as do our observations of Buller's Shearwaters elsewhere in the eastern tropical Pacific (Spear and Ainley, unpubl. data).

Seabird Abundance in Relation to Oceanographic Factors

Lower sea-surface temperature, higher salinity, and a shallow, less stratified thermocline are evidence of mixing in the water column due to fronts (upwelling and/or divergences/convergences; reviewed in Owen 1981, Fiedler et al. 1991). These conditions increase primary productivity and the food of higher-order predators. It was not surprising, therefore, that densities of each predominant species except the White Tern were correlated with one or more of these variables and that most correlations indicated preference for more productive surface waters. The Wedge-tailed and Newell's shearwaters, Bulwer's and Black-winged petrels, Leach's Storm-Petrel, and Sooty Tern preferred low temperatures or high salinity, and the Dark-rumped, Black-winged, Juan Fernandez, White-necked, and Bulwer's petrels preferred shallow and/or less stratified thermoclines. Consistent with these findings, we saw the White-necked and Pycroft's petrels in Hawaiian waters only in 1989 and especially 1988. Oceanographically, La Niña 1988 was a year of unusual conditions in the study area, with the coolest surface water, shallowest thermocline, and most mixed thermal structure encountered during the 8-year study (Ainley and Spear, unpubl. data).

The high densities of seabirds during spring in the southernmost region (zone 4) were due mostly to the abundance of "tuna-birds," the Sooty Tern, Wedge-tailed Shearwater, and Juan Fernandez and White-necked petrels (see King 1970 for similar results). High densities of these species in these waters in spring were consistent with the significantly higher number of feeding flocks foraging on prey forced to the surface by tunas. This finding was probably related to the proximity of these waters to the enriched surface layer along the northern boundary of the east-flowing Equatorial Countercurrent (Wyrtki 1966, Fiedler et al. 1991, Ballance et al. 1997). During May and June this current reaches its northern apex, with divergence at about 10° N, where surface waters escape and move north into the west-flowing North Equatorial Current (Wyrtki 1966). Consistent with this idea, Murphy and Shomura (1972) found that the Equatorial Countercurrent has higher densities of schooling surface-feeding smaller tunas than the North Equatorial Current. Other studies also have noted the importance of the Equatorial Countercurrent as a seabird feeding area (Gould 1974, King 1974, Au and Pitman 1986, Spear et al. 1995, Ballance et. al. 1997).

Among breeding species, the Sooty Tern, Wedge-tailed Shearwater, and Bulwer's Petrel *decreased* significantly in abundance with increase in distance from Hawaii during the breeding season in spring (see King 1970 for similar results). In contrast, in autumn, densities of the former two *increased* with distance from Hawaii, and the Bulwer's Petrel disappeared. During autumn, a similar pattern of increased density with distance from Hawaii was also seen in the Dark-rumped Petrel (during spring, the distribution of this species was bimodal). These results indicate that in autumn feeding conditions also were better in the southern part of the study area and, in turn, suggest that, to facilitate breeding, some species may have been constrained to feed in less productive waters near the Hawaiian Islands.

Additional evidence indicating better food supply in the more southern waters was the density increase with increase in distance from Hawaii during spring in the Black-winged, Juan Fernandez, and White-necked petrels (nonbreeding residents that nest in the South Pacific; see King 1970 for similar results), and Newell's Shearwater, a breeding species. A likely explanation for use by the shearwater of more southern waters during the breeding season is that it is a very fast flier, capable of breeding on Hawaii while foraging at greater distances (Spear et al. 1995, Spear and Ainley 1997).

Thus, of the 10 predominant species (excluding migrants), the White Tern was the only breeder with no distributional patterns relative to island distance. Similarly, the Leach's Storm-Petrel, with densities decreasing with increase in distance from Hawaii in spring, was the only nonbreeder not conforming to the idea that unconstrained species should forage in more southern waters. The inshore distribution of the Leach's Storm-Petrel (a planktivore) in spring, and moderately high incidence of feeding over tuna by seabirds in waters near Hawaii (zones 1 and 2), is consistent with an "island effect" (Murphy and Shomura 1972). These authors found that Skipjack Tuna (*Katsuwonus pelamis*; a smaller, surface-feeding tuna), as well as smaller Yellowfin Tuna (*Thunnus albacares*), were abundant just offshore of mid-Pacific archipelagos.

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RAPTOR MIGRATION IN AUTUMN THROUGH THE UPPER TANANA RIVER VALLEY, ALASKA

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Raptor migration in Alaska is not well documented (Swem 1982, Mindell and Mindell 1984). The upper Tanana River valley, in east-central Alaska, is a well-known migration route for many species of Alaska birds (Kessel 1984, Cooper et al. 1991). Ambrose's casual observations of migrating raptors from 1976 to 1986 suggested that the area also may be a major raptor-migration corridor in autumn.

We initiated autumn raptor-migration counts and banding in the upper Tanana River valley in September 1987. We developed the project in response to an environmental-impact statement prepared for the proposed construction of a receiving site for an "over-the-horizon backscatter" radar unit near Tok, Alaska. Information gathered for the statement suggested that the radar antennas associated with the unit posed a potential collision hazard to migrating birds, especially large ones such as geese, swans, cranes, and raptors (Cooper et al. 1991). The main objective of our raptor counts was to record the numbers and species of raptors migrating through the upper Tanana River valley in autumn. This paper summarizes results of raptor counts from 1987 to 1994 and discusses the potential of raptor-migration counts as tools for monitoring population trends of certain species of raptors in Alaska.

STUDY SITE

The count site, Dry Lake (63° 40′ N, 141° 30′ W), lies approximately 74 km southeast of Delta Junction and just north of milepost 1376 along the Alaska Highway. Dry Lake is an intermittently flooded 300-acre lake bed, located at one of the narrowest points of the upper Tanana River valley. At an elevation of 350 m , it is within 0.5 km of a major slough of the Tanana River. The Alaska Range, cresting in this area at 2000 to 3000 m, rises approximately 8 km south of Dry Lake and may be a barrier for migrating birds flying directly south. The Yukon–Tanana Uplands, a series of broad hills that crest at approximately 750 m elevation, begin 2 km to the north of Dry Lake. Dry Lake is surrounded by forests of Black Spruce (*Picea mariana*), White Spruce (*P. glauca*), and Balsam Poplar (*Populus balsamifera*). A 500-acre agricultural area lies 2 km to the west.

Temperatures during the count periods ranged from lows of –18°C in late September and October to highs of 31°C in early September. Prevailing winds during the count period in all years were from the south and southeast. South and southeast winds ≥30 mph were not uncommon during the count periods.

METHODS

Our counts extended from late August until mid-October (Table 1). We did not make counts in 1989 or 1990. Observers equipped with binoculars (10 × 40) and a variable-power spotting scope made observations from or near a trapping blind on the eastern side of Dry Lake. The location provided unobstructed views to the southwest, west, and northwest. Counts usually began approximately 30 minutes after sunrise and ended at sunset. We did not count during heavy rain or snow. Two observers made observations in 1987 and 1988. In all other years, one observer made the count >60% of the time.

We identified the species of migrating raptors as they crossed an imaginary north/south plane extending from the observer. Raptors that could not be identified were categorized as large, small, or unidentified. We collected weather data hourly (temperature, surface wind direction and speed, and cloud cover) and recorded all data on standardized forms.

RESULTS

Raptor migration in the upper Tanana River valley was well under way by late August and early September each year of the count. The peak flights of most species, except the Rough-legged Hawk and Golden Eagle, occurred in mid-September in all years.

We counted raptors an average of 9.6 hours per count day for a total of 1926 hours over the six years. We counted a total of 7407 migrating raptors of 13 species from 1987 to 1994 (Table 2). Pooling data from all years, we counted 3.85 raptors per count hour and 1234 raptors per count year (Table 2).

Migrant raptors passed by Dry Lake over a broad front approximately 8 km wide and were moving southeast. Buteos generally migrated along a series of disconnected hilltops and mountains to the south and north of Dry Lake, usually flying at least 300 m above the ground. Other species flew at various altitudes. Many Northern Harriers and American Kestrels passed by at heights under 50 m and often stopped to hunt in the lake bed.

The Northern Harrier was the most commonly observed species annually, composing 35.3% of the total number of raptors observed in all years. The Rough-legged Hawk was the second commonest species, composing 18.3%

Table 1 Raptor Count Periods, Dry Lake, Alaska, 1987–1994

Year	Count Period	Count Days	Count Hours
1987	7 Sep–18 Oct	38	301
1988	27 Aug–15 Oct	43	460
1991	27 Aug–30 Sep	33	346
1992	27 Aug–30 Sep	32	286
1993	28 Aug–2 Oct	33	332
1994	8 Sep–1 Oct	22	201

Table 2 Summary of Raptors Counted During Autumn Migration, Dry Lake, Alaska, 1987–1994

Species	1987	1988	1991	1992	1993	1994	Total
Osprey (*Pandion haliaetus*)	2	13	3	1	21	13	53
Northern Harrier (*Circus cyaneus*)	329	802	524	366	435	138	2594
Sharp-shinned Hawk (*Accipiter striatus*)	113	114	110	103	185	76	701
Northern Goshawk (*Accipiter gentilis*)	39	38	18	5	12	5	117
Red-tailed Hawk (*Buteo jamaicensis*)	81	153	58	36	213	39	580
Rough-legged Hawk (*Buteo lagopus*)	315	457	79	160	265	277	1553
Bald Eagle (*Haliaeetus leucocephalus*)	28	55	17	35	19	8	162
Golden Eagle (*Aquila chrysaetos*)	31	21	8	20	10	12	102
American Kestrel (*Falco sparverius*)	30	82	104	93	53	25	387
Merlin (*Falco columbarius*)	79	79	74	52	59	13	356
Peregrine Falcon (*Falco peregrinus*)	11	21	5	15	3	0	55
Gyrfalcon (*Falco rusticolus*)	2	0	1	2	0	0	5
Short-eared Owl (*Asio flammeus*)	8	26	7	2	1	2	46
Large raptor	12	234	4	23	26	18	317
Small raptor	15	123	6	34	36	16	230
Unidentified raptor	12	73	11	21	38	8	163
Total	1107	2291	1029	0968	1376	0636	7407

of the total number of raptors seen over all years. We counted more Rough-legged Hawks in 1987 and 1988 when the count period extended into mid-October. In several years, we observed small movements of Short-eared Owls. Owls were usually seen at dusk or dawn and often hunted in the lake bed.

We did not identify 10% of the total number of migrants observed. Most of the unidentified raptors were seen at distances >4 km and could not be identified to species. From their size and behavior we believe that most of the large raptors were Red-tailed or Rough-legged Hawks and most of the small raptors were Sharp-shinned Hawks or American Kestrels.

DISCUSSION

Results from our counts suggest that many raptors migrate through the upper Tanana River valley in autumn. The number of migrating raptors

observed at Dry Lake are far less than those recorded annually at well-known raptor migration sites farther south such as Hawk Mountain, Pennsylvania, Cape May, New Jersey, the Goshute Mountains, Nevada, and Golden Gate National Recreation Area, California. We expect fewer migrants to pass by Dry Lake than by concentration points farther south because migrants observed at Dry Lake are departing their northwestern terminus of range; at lower latitudes such passage includes not only departure of local birds but the movements of those drawn from enormous areas farther north (including birds that may pass Dry Lake). Interestingly, our annual counts of Northern Harriers are similar to or higher than counts of this species made at count sites at lower latitudes in North America. Northern Harriers often hunted in Dry Lake; the large number of harriers observed may be a result of this behavior.

We probably underestimated numbers of raptors migrating by Dry Lake each autumn because counts were made simultaneously with trapping. Instead of constantly searching the skies for migrants, our efforts were often focused on trapping, banding, and measuring birds. Additionally, our counts were biased toward species using the lake bed for hunting and toward species we were trying to capture. Because of this we probably missed many raptors migrating along ridges to the north and south of Dry Lake. Finally, our count periods were not equal every year and were not long enough to include early and late migrants. Despite these shortcomings, our counts indicate that raptors concentrate in this area in autumn and that this is an important migration corridor for raptors leaving Alaska.

Migrants observed at Dry Lake most likely come from breeding areas in interior, western, and northern Alaska. This area encompasses millions of acres of boreal forest, taiga, and alpine and arctic tundra. Population trends of many raptors in these areas are unknown because of the logistical difficulty and expense associated with working in remote areas of Alaska. We suggest that migration counts, in association with increased sampling on breeding grounds, may be a useful technique for monitoring population trends of certain species of raptors in Alaska (Titus et al. 1989).

Dry Lake is a logical site to conduct raptor counts in eastern Alaska because it is located at one of the narrowest points in the upper Tanana River valley where migrating raptors tend to concentrate within a relatively narrow area. Equally important, Dry Lake is easily accessible by vehicle from the Alaska Highway, keeping logistical costs down. Because data from migration counts maybe useful for monitoring population trends of raptors, we need to continue to search for new raptor-concentration sites in Alaska and other northern areas. These general areas include the upper Yukon River valley, the upper Tanana River valley, southeast Alaska (including coastal areas), and western Canada (Yukon and British Columbia). The only other raptor migration count in Alaska is in the Matanuska Valley in south-central Alaska (B. Dittrick and T. Swem pers. comm.). Counts at the Matanuska site are also made simultaneously with trapping. The numbers of raptors passing through the Matanuska Valley are similar to those at Dry Lake, but the species composition of the flight is slightly different (T. Swem unpubl. data). Efforts are also underway to find monitoring sites for raptors in Yukon, and raptor monitoring is well established in Alberta, Canada (Sherrington 1998).

We plan to continue our raptor counts at Dry Lake, and we encourage others to establish new raptor counts in Alaska and western Canada. In the future we plan to standardize annual count periods to provide data consistent from year to year and to run the count separately from the trapping. We also plan to experiment with sampling designs to provide estimates of numbers of raptors migrating through the upper Tanana River valley in autumn. Finally, we need to assess the usefulness of count data from Dry Lake for monitoring population trends of selected species of raptors (such as the Northern Harrier) breeding in Alaska.

SUMMARY

We counted migrating raptors in the upper Tanana River valley in eastern central Alaska from 1987 to 1994. Over the study period we counted migrating raptors on 201 days, averaging 33.5 count days per year. On average we counted 1234 migrating raptors each autumn. The Northern Harrier and Rough-legged Hawk were the most numerous species observed during the counts. We recorded peak numbers of most species, except the Rough-legged Hawk and Golden Eagle, from early to mid-September each years. Our results indicate that the upper Tanana River valley is an important migration corridor for raptors in autumn. We suggest that migration counts have high potential as a technique for monitoring of population trends of certain species of raptors in Alaska. However, more such sites and data collected on breeding grounds are needed to test the potential of using raptor counts to monitor trends in Alaska breeding populations.

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FIRST RECORD OF THE IVORY GULL IN CALIFORNIA

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On 5 January 1996 at about 0945 Weintraub, Carolyn Raynesford, Lucy Lee, and Irene Horiuchi found an immature Ivory Gull (*Pagophila eburnea*) on a gravelly beach at Doheny State Beach, Dana Point, Orange County, California (33° 27′ 33″ N, 117° 40′ 31″ W). Later the bird flew to the nearby mouth of San Juan Creek where it was subsequently seen by approximately 25 observers including San Miguel. It left the beach sometime between about 2230, when the last observer saw it with a flashlight and by a full moon, and 0400 the next morning, when it was next actively searched for. The California Bird Records Committee (CBRC) reviewed numerous reports and photographs taken of the bird that day and unanimously accepted the sighting as the first record of Ivory Gull for California.

During most of the daylight hours the Ivory Gull sat alone at the high surf line. It appeared fatigued and allowed observers to get within a few meters. It often sat with its belly on the wet sand with its head slowly drooping and eyes closed. A few times the bird stood and drank sea water, and fluid was seen dripping from the bill, presumably brine from its salt gland. When the bird was standing, one of its wings often drooped, and a few times oncoming waves knocked the bird off its feet. As the afternoon progressed, its condition appeared to deteriorate. According to one observer who saw the gull at about 2130, however, it was very active and was flying along the beach.

DESCRIPTION

The bird's length as it stood, estimated from one photograph that showed a stick (later measured) in front of and parallel to the gull, was about 38 cm. The gull was quite distinctive in its mostly white body, elongated wings, short legs, compact shape, and high round crown (Figure 1). The small bill was greenish gray with a pinkish yellow tip; the straight culmen was rounded at the tip. Black mottling on the face was most intense in the lores and on the chin and upper throat. Fine white crescents were present above and below the dark eyes. Widely scattered black spots marked the crown and sides of the neck, and the auriculars had distinct black spots. The primary tips were black, narrowly edged with white at the extreme tips. Nine primaries were visible beyond the tertials, and four primary tips extended beyond the tail. The borders of the black marks were sharply defined distally but were somewhat ragged basally, extending up the shafts on some feathers. The primary coverts and rectrices were all similarly marked, as were some of the upper tail coverts. Only sparse black spots marked the lesser and median secondary coverts, while the secondaries and greater secondary coverts were all white. There were two black spots on the tertials. Figure 2 shows the bird in flight and the markings on its upper surface. Other photographs of this bird can be found in McCaskie (1996) and Weintraub (1996).

Figure 1. The Ivory Gull at Doheny State Beach, Dana Point, California, on 5 January 1996.

Photo by Joel Weintraub

The underparts were almost pure white except for one gray spot on the breast and a few black spots near the tips of the outermost undertail coverts. On a few occasions the bird stretched its wings, revealing pure white underwings and coverts. White feathers extended down to the ankle joint; the joint was flushed with reddish. The short legs and fully webbed feet were black.

STATUS AND DISTRIBUTION

One of the more unusual vagrants to have occurred in California, this immature Ivory Gull represents the southernmost occurrence of this species, eclipsing a record at Choshi, Honshu, Japan (at 35°43′ N) in 1981 (Brazil 1991), and the first accepted record for the Pacific coast of North America south of Canada. The Ivory Gull breeds exclusively in the Arctic. It breeds in the Canadian Arctic at Ellesmere, Seymore, Baffin, and Perley islands, with a population estimated at 2400 (Thomas and MacDonald 1987). It also breeds in northern Greenland and Spitzbergen, and in Russia in Severnaya Zemlya, Novaya Zemlya, and Franz Josef Land (Haney and MacDonald 1995).

From early September to mid October the Ivory Gull migrates south, wintering primarily at the edges of pack ice, on icebergs and drift ice (Cramp 1983, Haney and MacDonald 1995). In the Bering Sea it is common from October through June (Kessel and Gibson 1978). It is a late-winter and early-spring visitor to Newfoundland and Labrador, where several hundred have been seen. The Ivory Gull also winters regularly south to the Gulf of St. Lawrence and rarely straggles to Nova Scotia and New Brunswick (Harrison 1983).

Figure 2. Ivory Gull in flight at Dana Point on 5 January 1996.

Photo by Joel Weintraub

In the contiguous United States records of the Ivory Gull are predominantly from the northeast (Mlodinov and O'Brien 1996). From 1972 through 1994 there were 17 records from Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York and New Jersey; the species has been recorded along the Atlantic coast as far south as Delaware and Virginia. Fourteen records from Minnesota, Iowa, Wisconsin, Illinois, Ohio, and Tennessee have been accepted since 1972. Farther west, the Ivory Gull was recorded in Colorado in 1926 (Bailey 1926) and Montana in 1974 (Skaar 1980). Most far-southern records in North America are for late November to early March, with the peak from late December to mid-January. Most vagrants are immatures.

The Ivory Gull is a rare vagrant to southern and southeastern Alaska (Kessel and Gibson 1978); on the west coast of North America south of Alaska the

only previous accepted records of this species are five from British Columbia, the earliest in 1889 and the most recent in 1988 (Campbell et al. 1990). There is still no satisfactory record for Washington. One reported at Gray's Harbor on 20 December 1975 (Crowell and Nehls 1976) was not accepted by Washington's records committee. The carcass of an "absolutely white" bird found at Destruction Island, Jefferson Co., on 15 November 1916 was badly decomposed and not preserved (Jewett et al. 1953).

Records of vagrant Ivory Gulls other than ours have been associated with much colder temperatures, ice, and snow. We do not know what caused the Ivory Gull to appear to be so lethargic or why its behavior changed dramatically later in the evening. Uspenskii (1969) and Orr and Parsons (1982) suggested this species is more active at night during the winter. Some of its daytime behavior on the beach at Dana Point might be attributed to thermoregulatory difficulties. The bird was obviously experiencing higher air and seawater temperatures (14° C for both at 0935 on 5 June; data from the Dana Point Harbor Weather Station) than it would experience in its normal wintering range. We also do not know what route (from offshore, down the coast, or inland) the gull took to get to Dana Point, but two weeks prior to its appearance, an intense low-pressure area centered in the Gulf of Alaska generated one of the strongest storms along the west coast in the last decade, with hurricane-force gusts approaching 191 km/hr (NOAA 1995).

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NOTES

SNOWY PLOVER DIETS IN 1995 AT A COASTAL SOUTHERN CALIFORNIA BREEDING SITE

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The Snowy Plover (*Charadrius alexandrinus*) feeds by pecking at the ground for invertebrates and catching insects in the air while on the run. Along the Pacific Coast, Snowy Plovers feed on both marine and terrestrial invertebrates, but little more specific information is available (Reeder 1951, Page et al. 1995).

Various methods are available for studying avian diets, including stomach content, fecal analysis, and direct observation (Rosenberg and Cooper 1990). Stomach-content analysis requires sacrifice of a large number of birds or the use of stomach pumps (Ramer et al. 1991, Martin and Hockey 1993). Poulin and Lefebvre (1995) reported tartar emetic to be safe and more effective than fecal analysis for investigating avian diets, yet 70 (2.9%) of the birds they sampled died. They found some families were more sensitive to the chemical than others and did not test it on plovers. Use of these techniques on a threatened bird like the Snowy Plover would not be acceptable or appropriate (Ralph et al. 1985). Direct observation of the prey of small shorebirds is difficult because their prey are so small (Baker 1977, Rundle 1982).

Fecal analysis has been used successfully in diet studies of other shorebirds (Swarth 1983, Nicholls 1989, Le V. Dit Durrel and Kelley 1990, Shaffer and LaPorte 1994). Although there is some bias associated with fecal analysis due to the differential digestion and passage rates of prey items, there is generally good agreement between fecal and stomach-content analyses (Rosenberg and Cooper 1990). Fecal samples are relatively easy to collect, and prey fragments are easily extracted because birds lack digestive enzymes capable of breaking down chitinous exoskeletons (Swarth 1983). Soft-bodied organisms such as polychaete worms, however, break down readily and are not well represented in fecal samples (Rundle 1982, Shaffer and LaPorte 1994).

The objectives of this study were to describe the diet of the Snowy Plover during the 1995 breeding season at a single coastal southern California breeding site and to identify available invertebrate prey in the same area. We chose to use fecal samples as the least invasive method to investigate diets to minimize the impacts on this threatened species.

The Santa Margarita River mouth, in Camp Pendleton Marine Corps Base (33° 13' 57" N, 117° 24' 37" W), San Diego County, provides a variety of habitats for foraging and breeding Snowy Plovers. As part of ongoing research on Snowy Plovers in southern California, Powell et al. (1995) estimated that the population breeding at this site in 1995 was 92 males and 69 females. Sandy beach and salt flats were the major habitats used for nesting.

We collected fecal samples opportunistically between April and July of 1995 during routine nest monitoring and banding. We observed adult and young plovers first through binoculars or spotting telescopes, then searched the ground where we observed a bird defecating. We found that binoculars worked better than spotting scopes, because of better depth of field definition, especially when we worked alone. We easily distinguished fresh feces from old, dried droppings. We did not collect samples if there was any doubt whether they had been deposited by a Snowy Plover. Actively foraging plovers defecate about every eight minutes (Swarth 1983). Snowy

Plovers can forage far from their nests, so we could not assume that fecal samples collected in a particular habitat contained fragments of prey that were actually consumed there. Collected feces were labeled with the date, location, and identity of the individual plover, then preserved in 70% ethanol.

We identified fecal contents through an Olympus SZ10 research stereo dissecting microscope, and used our reference collections to help identify exoskeleton fragments (Table 1). We attempted to identify fragments to family or order by direct comparison of parts to our reference collection, combined with keys to invertebrate identification (Ricketts et al. 1985, Borror et al. 1989).

In addition to fecal samples, we sampled invertebrates to build a reference collection and obtain a qualitative inventory of prey items. The habitats at the sampling sites, all located south of the Santa Margarita River mouth, were unprotected sandy beach, protected sandy beach, salt flat, and mudflat. The unprotected sandy beach site, which was exposed to wave action, included upper (above the tideline) and lower (intertidal) beach. The mudflat consisted of a 5-cm sun-baked clay layer covered with benthic algae, and underneath the clay layer there was coarse wet sand. Salt flats were sampled during both "normal" dry conditions and after very high spring tides had inundated large sections of this area. The Santa Margarita River changed course in 1993, leaving a small tidal lagoon in its old path, and the protected sandy beach site, which was not exposed to wave action, was located in this area. We did not sample much in sand dunes to avoid disturbing the Least Terns (*Sterna antillarum*) nesting there.

We used sticky traps and sweep nets to collect flies and other flying insects and sticky traps to capture crawling insects. Subsurface invertebrates were collected with cores taken to 5 cm (the distance likely to be accessible to a probing plover) and then sifted through a 1-mm sieve. We occasionally captured by hand. Pit traps were not used since they could trap plover chicks. Invertebrates were labeled with location and date and preserved in 70% ethanol.

The prey items identified in 32 fecal samples from adult plovers included at least nine families in six orders of insects (Figure 1). Beetles (Coleoptera) occurred in 23 (72%) of the samples, and rove beetles (Staphylinidae) were the most frequent prey. Half of the fecal samples collected at the unprotected sandy beach site contained remnants of rove beetles only. Flies (Diptera) occurred in 14 (44%) of the fecal samples, and a single fecal sample from the unprotected sandy beach site contained over 35 fly heads. Long-legged flies (Dolichopodidae) and shoreflies (Ephydridae) were the primary dipteran families found in the feces (Figure 1). Insect larvae were

Table 1 Fragments Found in Snowy Plover Fecal Samples Used for Invertebrate Identification

Order	Family	Parts used for identification
Coleoptera	Staphylinidae	elytra, wings, carapace, head, mandible, antennae, legs
	Carabidae	carapace, head, mandible
	Cicindelidae	carapace, elytra
Diptera	Ephydridae	wings, head, abdominal segments
	Dolichopodidae	wings, head, legs, abdominal segments
	Anthomyiidae	wings, head
Hymenoptera	Braconidae	wings
Hemiptera	Saldidae	wings, body, head
Decapoda	Hippidae	carapace
Neogastropoda	Nassaridae	shell

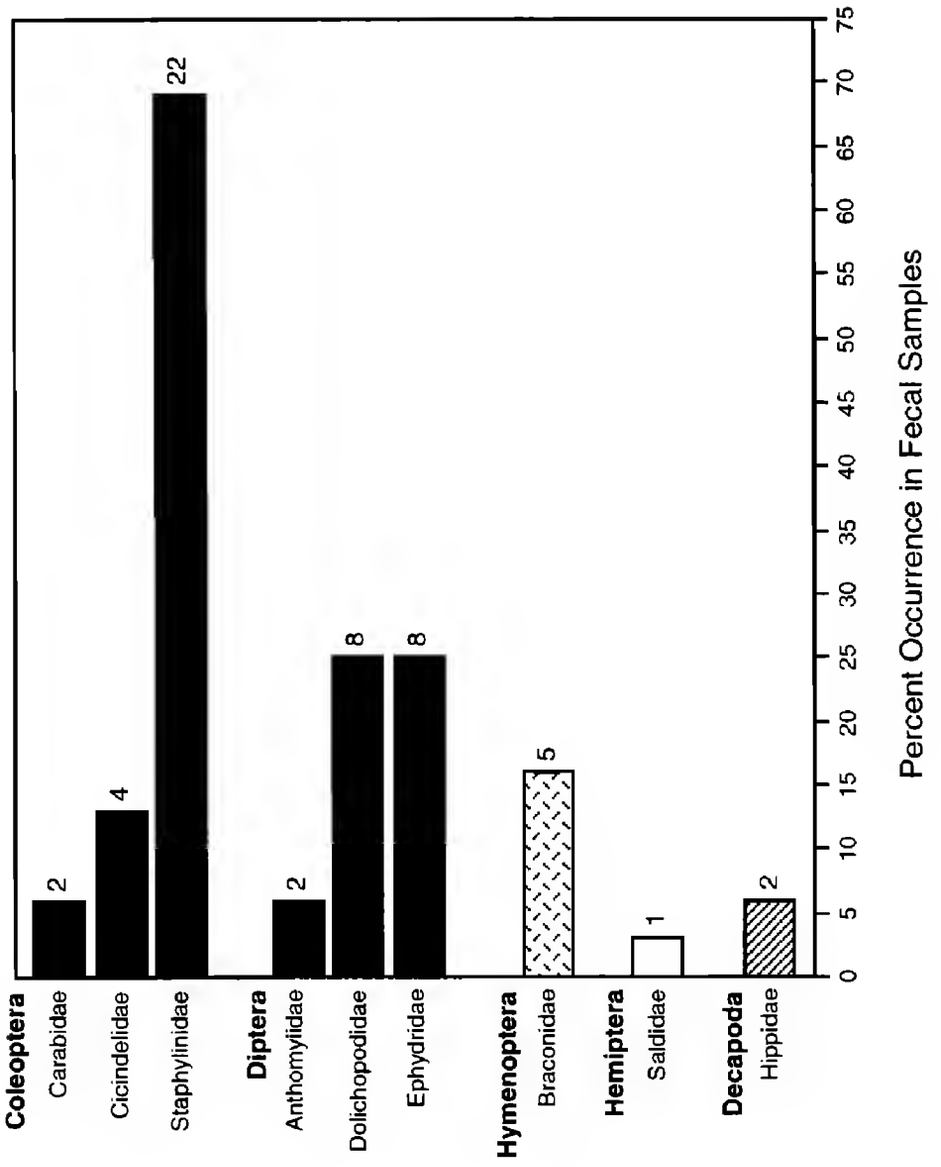

Figure 1. Frequency of various families of invertebrates in fecal samples of adult Snowy Plovers. Numbers to the right of bars indicate number of samples.

found in 16 (25%) of the fecal samples, especially in salt flat and protected sandy beach habitats. Ninety-seven percent of all feces collected from adults contained at least one of these three insect families: the Staphylinidae, Dolichopodidae, or Ephydridae.

The feces of three fledglings and one two-week-old chick were collected from sandy beach sites. All four samples included rove beetles. Long-legged flies were in two samples, Braconidae in one sample, and insect larvae in one sample. The feces of the two-week-old chick contained only rove beetles.

We identified 22 families of invertebrates in samples from all habitats. The insect families were the Ephydridae, Dolichopodidae, Anthomyidae, Coelopidae, Asilidae (Diptera); Staphylinidae, Carabidae, Cicindelidae, Curculionidae, Tenebrionidae (Coleoptera); Braconidae, Dryinidae, Formicidae (Hymenoptera), and Saldidae (Hemiptera). Non-insect families were the Hippidae (Decapoda), Conidae (Gastropoda), Halacaridae (Acarina), and five of polychaetes (Annelida): the Spionidae, Glyceridae, Arabellidae, Capitellidae, and Opheliidae. Dolichopodidae and Ephydridae were present in all habitats sampled, and Staphylinidae occurred in all but one of the habitats. Unidentified insect larvae were collected at both sandy beach sites. The greatest variety

of potential prey items available to foraging plovers occurred at the unprotected sandy beach site, mainly because of the presence of five families of polychaete worms.

Snowy Plovers appeared to concentrate their foraging effort on a few terrestrial insect families (mainly flies and beetles) at the Santa Margarita River mouth. The families most abundant in our samples were widely distributed among habitats. However, polychaete worms are digested too completely to be identified in fecal samples by our technique, so the extent to which worms contributed to the diet of Snowy Plovers in our study was unknown; they may be important. Reeder (1951) found polychaete worms in the stomachs of three Snowy Plovers collected during the breeding season along the southern California coast. We observed Snowy Plovers feeding on worms on several occasions. Polychaete worms could be important prey for Snowy Plovers foraging in intertidal areas.

Hofmann and Hoerschelmann (1969; cited in Cramp and Simmons 1983) reported that the stomach of one Kentish Plover (*Charadrius a. alexandrinus*) contained 124 beetle heads. Grover and Knopf (1982) reported rove beetles as abundant where Snowy Plovers forage in Oklahoma. We found rove beetles in the majority of fecal samples of Western Snowy Plovers at the Santa Margarita River mouth. However, because the percent occurrence of an organism in fecal samples is based on its presence or absence, the actual nutritional or volumetric contribution of rove beetles may not exceed that of other abundant prey, long-legged flies or shoreflies. Flies formed large, dense swarms, and plovers were frequently observed foraging within these swarms. Our results were consistent with the findings of diet studies of the Snowy Plover elsewhere. Swarth (1983) found beetles and shoreflies constituting the major prey of Snowy Plovers at Mono Lake, California; Grover and Knopf (1982) found them as prey on the Great Salt Plains of Oklahoma. Kentish Plovers in Europe also feed on terrestrial invertebrates, mainly flies and beetles (Cramp and Simmons 1983).

Snowy Plover chicks are highly precocial and leave the nest within a day of hatching to forage in the same habitats as their parents. Although the number of fecal samples from juveniles in our study was small, fledglings fed on the same organisms, with the exception of dipterans, as adults. Plover chicks may be unable to catch fast-moving insects such as dipterans and hymenopterans (Shaffer and LaPorte 1994).

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A SIGHT RECORD OF A STREAKED SHEARWATER IN OREGON

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On 13 September 1996, while conducting surveys for marine mammals and seabirds aboard the NOAA ship *McArthur* about 57 kilometers off the southern Oregon coast, we found a Streaked Shearwater (*Calonectris leucomelas*), a species familiar to both Force and Rowlett. The bird was seen at 08:40 in a large mixed feeding flock over Heceta Bank, Lane County, Oregon (43° 59.1′ N, 124° 51.4′ W). This constitutes the first record of the Streaked Shearwater for Oregon and the most northeasterly Pacific Ocean occurrence.

We had unobstructed views from the ship's flying bridge, 14 meters above sea level. The bird was seen clearly for about two minutes and passed in front of the ship as close as 250 meters. It patrolled low over the water on the starboard side, passed in front of the ship, and eventually disappeared astern. We had a variety of binoculars available: 20 × 60 prism-stabilized Zeiss (Force), 25 × 150 ship-mounted Fujinons (Rowlett), and 7 × 50 hand-held Fujinons (Grace). The ship was engaged in a line-transect survey of marine mammals whose protocol prevented further investigation. We prepared field notes immediately after the bird was lost from view and before consulting any references. A written report is on file with the Oregon Bird Records Committee.

General Appearance: The bird appeared to be in fresh plumage with no sign of molt, suggesting that it may have been in its first year. Fairly large and long-winged, gleaming white below and brown above with a striking white head when seen at a distance. Pale-tipped back feathers gave it a saddled appearance. *Body*: Underparts from chin to undertail coverts bright white. Back like upperwings but slightly darker with a very faint grayish cast. Rump dark brown, contrasting slightly with back. Mantle and rump feathers narrowly tipped with pale gray or buffy white, creating a faintly scaled effect. *Head*: Forehead and crown white; nape streaked with dusky brown. Darker, diffuse brownish smudge around eye extended posteriorly and coalesced with streaking on hindneck. *Wings:* Underwing coverts bright white. Grayish brown remiges created a dark tip and tailing edge of medium width on the underwing. Grayish brown and white under-primary coverts formed a conspicuous dark patch near the wrist. Upperwings dark brown, slightly paler than the back. *Tail:* Brown, somewhat long and slightly wedge-shaped. *Bill:* Yellowish gray, long and slender, with well defined black tip.

The Streaked Shearwater was part of a large mixed feeding aggregation of more than 1000 birds loosely associating with two nearby fishing vessels. The bulk of the flock consisted of Sooty (*Puffinus griseus*), Pink-footed (*P. creatopus*), and Buller's (*P. bulleri*) shearwaters, Northern Fulmars (*Fulmarus glacialis*), and California Gulls (*Larus californicus*). Western Gulls (*L. occidentalis*) and Western × Glaucous-winged (*L. glaucescens*) gulls were also present. The Streaked Shearwater's overall size appeared to be between that of a Pink-footed and a Buller's, perhaps closer to Buller's. Its buoyant flight consisted of several slow, lazy flaps followed by a long, languid glide with low, wide arcs. The flight style combined with the wings held slightly forward with a prominent angle at the wrist recalled the Wedge-tailed Shearwater (*P. pacificus*), but the bird was larger with wider wings. Its structure and flight were quite different from those of nearby Pink-footed Shearwaters, which appeared chunky and labored by comparison.

The Streaked Shearwater was seen in the neritic province of the pelagic environment (continental shelf waters less than 200 meters deep). Sea-surface temperature was 13.2°C, salinity 32.48 parts per thousand. Approximate water depth obtained from a nautical chart was 108 meters (60 fathoms). The cloud cover had just begun to break after a morning of steady rain so light conditions were good with some glare on the starboard side. Wind was from the south at about 14 knots with a 6-foot southwest swell.

The Streaked Shearwater breeds in the western Pacific on islands along the Japanese and Korean coasts and in the Yellow Sea (including Qingdao Island), south along the coast of China to Taiwan. It is the most abundant nesting seabird in Japan, breeding on small islands from southwestern Hokkaido and the Izu Islands (the location of the largest known colony) south to include the Ryukyu Islands (Brazil 1991, Everett and Pitman 1993). A small but stable population of around 30 pairs on Karamzin Island, in Peter the Great Bay, Vladivostok, is the most northerly colony on the Asian coast (G. Kaiser pers. comm.). It is abundant within its range, with an estimated population of 4 to 5 million, nesting in large dense colonies on forested islands from February to November (peaking in May and June). After breeding the birds disperse south through the East and South China seas with the bulk of the population moving south of the Philippine Sea off New Guinea, where thousands occur November through February (Everett and Pitman 1993, Harrison 1983).

First recorded in Australia in 1974, the Streaked Shearwater is now known to be a regular nonbreeding visitor as far south as coastal Victoria (Blakers et al. 1984, Brazil 1991, Harrison 1983, Lindsey, 1986). A few continue west into the Indian Ocean and Arabian Sea and may be regular at least as far as the Maldives and Sri Lanka, with some straying as far west as Eilat, Israel (Harrison 1983, 1987, Morgan and Shirihai 1992, Van den Berg et al. 1982, 1990, Force pers. obs.).

The first Streaked Shearwater recorded for North America was an adult female collected from a mixed shearwater flock in Monterey Bay on 3 October 1975 (Morejohn 1978, Luther et al. 1979). Five of the six Streaked Shearwaters currently accepted by the California Bird Records Committee, all supported by a specimen or photograph, are from the Monterey Bay area. The sixth is of one found alive on a parking lot in Red Bluff, Tehama County, on the unusually early date of 13 August 1993 (Garrett and Singer 1998). The concentration of sightings in Monterey Bay may reflect the intense coverage this area receives in comparison to other coastal sites rather than its being an actual focal point for Streaked Shearwaters.

The five accepted Monterey Bay records extend over a brief period in the fall from 7 September to 9 October. Four were in years when Buller's Shearwaters were exceptionally common somewhere along the west coast of North America. It is conceivable that a Streaked Shearwater may occasionally associate with a flock of Buller's Shearwaters, perhaps somewhere in the western Pacific Ocean, increasing its chances of reaching the eastern Pacific. Buller's Shearwater has undergone a strong population increase after introduced pigs were eliminated from Aorangi Island, one of the primary New Zealand nesting colonies (Everett and Pitman 1990). Furthermore, the Streaked Shearwater has expanded its range south in the western Pacific (Blakers et al. 1984, Lindsey 1986). An increase has been documented in Australia with hundreds reported annually off that country's north coast between November and May (Blakers et al. 1984, Lindsey 1986). Similarly, sightings of Buller's Shearwater have increased in Australia, where it is now considered to be a regular visitor off the southeast coast (Lindsey 1986). The Oregon Streaked Shearwater was seen when high numbers of Buller's Shearwaters were being reported off the U.S. west coast. A commercial birding trip to Heceta Bank on 5 October 1996 tallied a record 290 Buller's Shearwaters, surpassing the previous state high by almost 150 (Greg Gillson pers. comm.).

The white face and forehead and the relatively pale appearance of the Streaked Shearwater enabled it to be relocated easily in a distant flock. The prominent dark carpal patch on a mostly white underwing was a useful field character not mentioned in the standard seabird guides. Morgan and Shirihai (1992) considered the carpal patch to be diagnostic, and it is described and readily visible in photographs in Stallcup (1990) and Bevier (1990). The extent and intensity of head streaking is subject to an unknown amount of variation. Since molt and aberrant plumages can cause similar species to appear white-headed in the field, this character should be used with caution.

Stable concentrations of feeding seabirds at such features of the continental shelf as submarine canyons or shallow banks hold high probabilities for future sightings of the Streaked Shearwater. It is gregarious and readily joins mixed feeding flocks (Blakers et al. 1984, Lindsey 1986, Force pers. obs.). Often containing hundreds of birds, these mixed-species assemblages are frequently targeted for scrutiny by an increasing number of commercial pelagic trips. Additional sightings of this attractive and distinctive shearwater are sure to follow.

We thank the officers and crew of the National Oceanic and Atmospheric Administration research ship *McArthur* for a comfortable and enjoyable observation platform during the 3-month cruise. We also thank chief scientist Jay Barlow and Lisa Ballance and Stephen Reilly of the Southwest Fisheries Science Center, La Jolla, California, for permission to publish the sighting and to be able to collect seabird-abundance data on behalf of the marine-mammal division. Robert Pitman and additional reviewers made useful comments on the manuscript.

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A PREVIOUSLY UNREPORTED NESTING COLONY OF THE YELLOW-CROWNED NIGHT-HERON NEAR MULEGE, BAJA CALIFORNIA SUR

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In Baja California, breeding of the Yellow-crowned Night-Heron (*Nyctanassa violacea*) has been reported from at least five locations, Islas San Benitos (28° 17′ N, 115° 22′ W), Laguna Ojo de Liebre (27° 45′ N, 114° 10′ W), Laguna San Ignacio (26° 50′ N, 113° 10′ W), Bahía Magdalena (24° 40′ N, 112° 00′ W) and Ensenada de La Paz (24° 20′ N, 110° 22′ W) (Wilbur 1987, Carmona et al. 1994, Massey and Palacios 1994, Howell and Webb 1995). Only the last is on the Sea of Cortéz side of the peninsula. During early April 1997, we observed six nests of the Yellow-crowned Night-Heron under construction in the top of Mexican Fan Palms (*Washingtonia robusta*, plant names follow Roberts 1989) paralleling the north side of the estuary at Mulegé, on the east coast of Baja California Sur (26° 53′ N, 111° 58′ W). The nests were situated so we could not see their contents, so data on initiation of egg laying, clutch size, and fledging success were not obtainable. However, we saw the birds roosting and bringing nesting material to the nest sites throughout April. During the spring of 1998, we found 14 active nests in a dense stand of mangrove (*Avicennia germinans* and *Rhizophora mangle*) on the south side of the estuary plus three nests on the north side in Mexican Fan Palms. Although one of us has lived in Mulegé seasonally since 1979 these are the first Yellow-crowned Night-Heron nests we have identified. Two stick nests in mangroves were reported by a vacationer in 1990 but not identified. Small numbers of overwintering birds, both adults and immatures, occur in the estuary during late fall and early spring (Whitmore and Whitmore 1997). Owing to the fragility and disjunct distribution of wetland habitats in Baja California (Massey and Palacios 1994), further study of this newly formed colony is warranted.

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SECOND MAINLAND SPECIMEN OF THE RED-BREASTED NUTHATCH FROM BAJA CALIFORNIA, MEXICO

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Since the first mainland record of the Red-breasted Nuthatch (*Sitta canadensis*) for Baja California (Ruiz-Campos and Quintana-Barrios 1991), from the Sierra Juárez (32°04′ N, 116°05′ W; altitude 1370 m) on 15 September 1990 in coniferous forest dominated by *Pinus jeffreyi*, no specimens of this species have been collected in Baja California.

On 27 October 1996 we collected a Red-breasted Nuthatch climbing on dead trunks of a shack near the beach in Bahía Santa Rosaliita, Baja California (28°39′32″ N, 114°14′52″ W), ca. 64 km southwest of Punta Prieta in the Vizcaino Desert district (Nelson 1921). The specimen (Univ. Autónoma de Baja California 859) is an adult male in nonbreeding condition.

With the Guadalupe Island population possibly extirpated (Howell and Webb 1995), the Red-breasted Nuthatch breeds south to southern Alta California, in San Diego County perhaps only irregularly (P. Unitt pers. comm.). It is subject to occasional massive irruptions that have taken this North American species as far from its normal range as Norfolk, England (Aley and Aley 1995).

Like several other montane forest birds, the Red-breasted Nuthatch irrupted on a large scale in the fall of 1996. Many were seen in the lowlands of southern Alta California throughout the winter of 1996–97, and birdwatchers from the United States observed at least 13 in Baja California, mostly immature individuals (five in the coastal lowlands, four in the Sierra Juárez, and four at Cataviña and Santa Inés [Ynez]). One at Bahía Tortugas, Baja California Sur, also in October, was even farther

south than our record (R. A. Hamilton pers. comm.). Our collection at Bahía Santa Rosaliita adds substance to this pattern of sight records.

Irrupting Red-breasted Nuthatches typically seek conifers, whether native or planted (Small 1994). Other trees serve if conifers are absent; vagrants to Baja California have used the Arroyo Willow (*Salix lasiolepis*), Mexican Fan Palm (*Washingtonia robusta*), and casuarina (*Casuarina* sp.). The habitat where we collected our specimen was treeless: coastal dunes, with nearby rock outcrops, vegetated with *Haplopappus* cf. *sonorensis*, *Frankenia palmeri*, and *Astragalus* sp. The bird's resorting to a wooded shack dramatized the extremes to which irrupting Red-breasted Nuthatches can be driven. Finally, this record makes evident the need for continuing investigation of the distribution of this species in México, for determining with precision its movements of migration.

We thank Robert A. Hamilton and Philip Unitt for their useful comments on the manuscript. Also, we thank Hamilton for sharing unpublished information on sight records of the Red-breasted Nuthatch in Alta and Baja California.

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FEATURED PHOTO

VARIATION IN IRIS COLOR OF ADULT THAYER'S GULLS

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Iris color is sometimes useful in bird identification, especially for gulls. A frequently quoted example is the separation of adult Herring (*Larus argentatus smithsonianus*) and Thayer's [*L.* (*glaucoides?*) *thayeri*] gulls. Typically, adult Herring Gulls have "staring" unmarked pale yellow irides, adult Thayer's Gulls dark irides, a view supported by numerous publications (e.g., Gosselin and David 1975, Lehman 1980, Grant 1986, Zimmer 1990, 1991). Each of these references, however, mentions that some adult Thayer's Gulls show paler irides with dark markings (e.g., "brown flecking in a pale iris," Grant 1986) but imply that such birds are infrequent. Zimmer (1990) wrote that the irides of adult Thayer's Gulls that are relatively pale still "appear solidly brown at any real distance," Grant (1986) that "none has (an) entirely clear yellow iris. On a single vagrant adult in Ireland, McGeehan and Millington (1998) noted a pale iris with brown flecking, which nevertheless appeared dark without a telescope view.

While studying gulls in the winters of 1996/97 and 1997/98, we found iris color in adult Thayer's Gulls to be highly variable, and from December 1997 to March 1998 we attempted to quantify this variation. At several sites in central California (Marshall and Bolinas, Marin Co.; Petaluma, Sonoma Co.; Hidden Lake and Lake Cunningham, Santa Clara Co.) we recorded the iris colors of 104 adult Thayer's Gulls by means of the following scale: 0.0, iris uniformly dark brown (as typical of a California Gull, *L. californicus*); 0.5, medium brown (as in a juvenile or first-winter Thayer's Gull); 1.0, pale brown or honey-colored (as typical of an adult Mew Gull, *L. canus brachyrhynchus*); 1.5, dusky, greenish, or dark yellow or amber, extensively mottled brown), 2.0, pale green or yellowish moderately marked with brown; 2.5, pale green or yellowish, lightly speckled with brownish; 3.0, unmarked yellowish (as typical of an adult Herring Gull). We found that close views are normally required for exact determination of iris color and pattern, a fact that readers should bear in mind when attempting to apply our results. We made our observations under overcast skies to minimize the effect of direct sunlight, and we frequently cross-checked our observations. When we considered an iris color intermediate between two scores, we rounded it down to the darker of the two scores, hence our results slightly underestimate the average paleness of adult Thayer's Gulls' eyes.

Our findings, summarized in Table 1, suggest that adult Thayer's Gulls more frequently show pale irides than appears to have been described previously. Most of the adult Thayer's Gulls we observed (87%) showed either pale brown irides or yellow or green irides with varying degrees of brownish mottling (scores 1.0–2.5). A significant proportion (27%) had largely pale irides (scores 2.5 or 3.0) that superficially resembled those of an adult Herring Gull even at distances greater than 20 m. Five percent showed irides that could not be separated by color or pattern from those of a typical Herring Gull (score 3.0). Only 9% of our sample showed irides that were wholly dark or medium brown (scores 0 or 0.5). Our data indicate that a yellow-green base color of the iris, variably mottled or speckled with brownish, is actually fairly common in adult Thayer's Gulls; thus, the literature appears to overstate the reliability of iris color as a character distinguishing adult Thayer's and Herring gulls.

Although the data are rather limited, we found no clear evidence of a seasonal change in iris color. We hope that further study will reveal to what extent, if any, adults' iris color changes with reproductive condition and/or season, and the age at which

Table 1 Iris scores of Adult Thayer's Gulls in Central California by Month

Score	December	January	February	March	Total
0.0	0	1	1	0	2
0.5	3	1	3	0	7
1.0	12	2	4	1	19
1.5	15	0	10	2	27
2.0	11	0	10	0	21
2.5	16	1	5	1	23
3.0	5	0	0	0	5
Total	62	5	33	4	104

Thayer's Gulls can start to show pale irides (rarely, a score of 2.5 can be reached by Thayer's Gulls in their second winter; King, pers. obs.).

The adult Thayer's Gull featured on the back cover was photographed by King at Marshall, Marin Co., California, on 20 December 1997. At long range (> 30m) in good light, this individual showed a "staring" yellowish iris, reminiscent of an adult Herring Gull. Closer inspection (down to 20 m) revealed very restricted fine brownish mottling on a yellowish iris (a score of 2.5). Other characters visible in the photograph supporting the identification of this bird as an adult Thayer's Gull are its relatively small body size, rounded head, medium gray upperparts, rather smudged dusky head and neck markings, rather small bill lacking a prominent gonydeal angle, dull yellow basal half of the bill, prominent purplish red orbital ring, and matt rather than jet black markings on the primary tips.

Adult Thayer's Gulls can also resemble the occasional adult Kumlien's [Iceland] Gulls [*L. (glaucoides?) kumlieni*] that show blackish primary markings. The iris of the adult Kumlien's Gull is generally described as variable, ranging from clear yellow to dark (Lehman 1980) or as "golden, amber, or even, rarely, brown" (Millington 1993). Therefore, while the iris of adult Thayer's Gull may average darker than that of Kumlien's Gull, we expect substantial overlap; a study of iris color in Kumlien's Gull similar to ours would help clarify the extent of this overlap.

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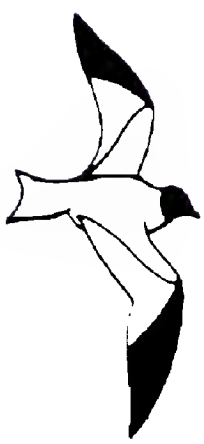

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Cover photo by ©Jack Jeffrey of Hilo, Hawai'i: Eye-browed Thrush *(Turdus obscurus)*, Midway Atoll, Hawai'i, December, 1997.

Western Birds solicits papers that are both useful to and understandable by amateur field ornithologists and also contribute significantly to scientific literature. The journal welcomes contributions from both professionals and amateurs. Appropriate topics include distribution, migration, status, identification, geographic variation, conservation, behavior, ecology, population dynamics, habitat requirements, the effects of pollution, and techniques for censusing, sound recording, and photographing birds in the field. Papers of general interest will be considered regardless of their geographic origin, but particularly desired are reports of studies done in or bearing on the Rocky Mountain and Pacific states and provinces, including Alaska and Hawaii, western Texas, northwestern Mexico, and the northeastern Pacific Ocean.

Send manuscripts to Kathy Molina, Section of Ornithology, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, CA 90007. For matter of style consult the Suggestions to *Contributors to Western Birds* (8 pages available at no cost from the editor) and the *Council of Biology Editors Style Manual* (available for $24 from the Council of Biology Editors, Inc., 9650 Rockville Pike, Bethesda, MD 20814).

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WESTERN BIRDS

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REPORT OF THE CALIFORNIA BIRD RECORDS COMMITTEE: 1996 RECORDS

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This report covers 232 records of 95 species submitted to the California Bird Records Committee (hereafter the CBRC or the Committee). Although most records pertain to birds found in 1996, the period covered by this report spans the 18 years from 1978 to 1996. Accepted were 178 records involving 71 species. The acceptance rate of 76.7 % was slightly higher than average. Fifty-one records were not accepted because of either insufficient documentation or the descriptions' being inconsistent with known identification criteria. Four additional records were not accepted because of questions concerning the bird's natural occurrence. A considerable effort is made by many observers to prepare reports and documentation for submittal to the Committee. This report would not be possible without the 213 observers who submitted reports to the Committee, and we thank them for their efforts.

Counties best represented by accepted records were Orange (27), San Diego (18), Monterey (17), Imperial (12), Kern, Los Angeles, Riverside, and Ventura (9), and San Francisco (8). Records from 18 other counties were accepted.

Highlights of this report include the addition of five species new to the California list: the Swallow-tailed Gull (*Creagrus furcatus*), Red-legged Kittiwake (*Rissa brevirostris*), Ivory Gull (*Pagophila eburnea*), White-winged Tern (*Chlidonias leucopterus*), and Buff-collared Nightjar (*Caprimulgus ridgwayi*). The Bristle-thighed Curlew (*Numenius tahitiensis*), Band-tailed Gull (*Larus belcheri*), and Couch's Kingbird (*Tyrannus couchii*) also have been accepted but will be treated in subsequent CBRC reports. With these additions, California's list stands at 607 species. Other highlights include the acceptance of a Great Frigatebird (*Fregata minor*) recorded 18 years ago, a photographed Black Vulture (*Coragyps atratus*), a record of a Whooper Swan (*Cygnus cygnus*) from 10 years ago that was previously not accepted, the

fourth occurrence of the Violet-crowned Hummingbird (*Amazilia violiceps*), the second and third records of the Cave Swallow (*Hirundo fulva*), the state's second Arctic Warbler (*Phylloscopus borealis*), and the fourth Eastern Wood-Pewee (*Contopus virens*), Smith's Longspur (*Calcarius pictus*), and Rustic Bunting (*Emberiza rustica*). An apparent hybrid Sandwich (*Sterna sandwichensis*) × Elegant (*S. elegans*) Tern was among the most interesting birds addressed. Potential first state records currently under review are of the Great-winged Petrel (*Pterodroma macroptera*), Parkinson's Petrel (*Procellaria parkinsoni*), Bulwer's Petrel (*Bulweria bulwerii*), Lesser White-fronted Goose (*Anser erythropus*), American Woodcock (*Scolopax minor*), Slaty-backed Gull (*Larus schistisagus*), Iceland Gull (*Larus glaucoides*), Ross' Gull (*Rhodostethia rosea*), Bridled Tern (*Sterna anaethetus*), and Olive-backed Pipit (*Anthus hodgsoni*).

Michael M. Rogers currently serves as the Committee's secretary. Past secretary David V. Blue served as CBRC technical-support specialist in 1998. The ten voting Committee members as of 1 January 1999 are Richard A. Erickson (chair), Matthew T. Heindel (vice chair), Kimball L. Garrett, Alvaro Jaramillo, Guy McCaskie, Joseph Morlan, Michael M. Rogers, Stephen C. Rottenborn, Mike San Miguel, and Daniel S. Singer. Recent Committee members who also voted on many of the records in this report include Shawneen E. Finnegan, Steve N. G. Howell, Michael A. Patten, Peter Pyle, and Scott B. Terrill.

The list of species reviewed by the CBRC is posted at the Western Field Ornithologists' World Wide Web site (http://www.wfo-cbrc.org). This site also includes the entire California state list, the Committee's bylaws, a reporting form for direct e-mail submission of records to the CBRC, the addresses of current Committee members, a photo gallery of recent submissions including several birds published in this report, a list of relevant publications by CBRC members, and other information about the CBRC, WFO, and its journal, *Western Birds*.

All records reviewed by the CBRC (including copies of descriptions, photographs, videotapes, audio recordings and Committee comments) are archived at the Western Foundation of Vertebrate Zoology, 439 Calle San Pablo, Camarillo, California 93012, and are available for public review. The CBRC solicits and encourages observers to submit documentation for all species on the review list, as well as species unrecorded in California. Documentation should be sent to Michael M. Rogers, CBRC Secretary, P. O. Box 340, Moffett Field, CA 94035-0340 (e-mail: mrogers@nas.nasa.gov).

As in other recent CBRC reports, records are listed geographically, from north to south, and/or chronologically by first date of occurrence. Included with each record is the location, county abbreviation (see below), and date span. The date span usually follows that published in *Field Notes* (formerly *American Birds*) but, if the CBRC accepts a date span that differs from a published source, the differing dates are italicized. Initials of the observer(s) responsible for finding and/or identifying the bird(s)—if known and if they have supplied documentation—are followed by a semicolon, then the initials, in alphabetized order, of additional observers submitting documentation, then the CBRC record number consisting of the year of observation and chronological number assigned by the secretary. All records are sight

records unless otherwise indicated: initials followed by a dagger (†) indicate the observer supplied an identifiable photograph, (‡) indicates videotape, (§) indicates a voice recording, and (#) indicates a specimen record, followed by the acronym (see below) of the institution housing the specimen and that institution's specimen catalog number.

An asterisk (*) prior to a species' name indicates that the species is no longer on the CBRC review list. The first number in parentheses after the species' name is the number of records accepted by the CBRC through this report; the second is the number of new records accepted in this report (because this number excludes records thought to pertain to returning individuals, it may be zero). Two asterisks (**) after the species' total indicate that the number of accepted records refers only to a restricted review period or includes records accepted for statistical purposes only; see Roberson (1986) for more information.

When individual birds return to a location after a lengthy or seasonal absence, each occurrence is reviewed under a separate record number, and Committee members indicate whether or not they believe the bird is the same as one accepted previously. Such decisions follow the opinion of the majority of members and, if a bird is considered a returning individual, the total number of records remains unchanged.

Although the CBRC does not formally review the age, sex, or subspecies of each bird, information on these subjects is often provided during the review process (and in some cases a strong or unanimous consensus is achieved). We have tried to report as much of this information as possible.

The CBRC uses standard abbreviations for California counties; those used in this report are ALA, Alameda; COL, Colusa; HUM, Humboldt; IMP, Imperial; INY, Inyo; KER, Kern; LA, Los Angeles; MRN, Marin; MEN, Mendocino; MTY, Monterey; NEV, Nevada; ORA, Orange; RIV, Riverside; SAC, Sacramento; SBT, San Benito; SBE, San Bernardino; SD, San Diego; SF, San Francisco; SJ, San Joaquin; SLO, San Luis Obispo; SM, San Mateo; SBA, Santa Barbara; SCL, Santa Clara; SCZ, Santa Cruz; SIS, Siskiyou; SON, Sonoma; VEN, Ventura; YOL, Yolo. A full list of county abbreviations is available on the WFO–CBRC web site. CBC, Christmas Bird Count; n. miles, nautical miles; N. W. R., national wildlife refuge.

Museum collections housing specimens cited in this report, allowing access to Committee members for research, or otherwise cited are the California Academy of Sciences, San Francisco (CAS), Natural History Museum of Los Angeles County (LACM), Pacific Grove Museum of Natural History (PGMNH), San Diego Natural History Museum (SDNHM), Santa Barbara Museum of Natural History (SBMNH), Museum of Vertebrate Zoology at the University of California, Berkeley (MVZ), Burke Memorial Museum at the University of Washington, Seattle (UWBM).

RECORDS ACCEPTED

YELLOW-BILLED LOON *Gavia adamsii* (60, 2). One 1.2 miles N of Otter Point, Pacific Grove, MTY, 7–28 Dec 1993 (SFB, DLSh; 1994-002) and one 0.5 mile W of Point Pinos, MTY, 5 Feb 1996 (LDO-E†; 1996-075) were both on Monterey Bay where this species has been found almost annually in the past 20 years.

MOTTLED PETREL *Pterodroma inexpectata* (54, 1). One at 30° 51' N, 121° 35' W (approximately 180 n. miles SW of San Nicolas I., VEN), 1 Apr 1993 (RRV; 1994-025) is the southernmost to be accepted off California.

DARK-RUMPED PETREL *Pterodroma phaeopygia* (5, 3). One was at 40° 36' N, 125° 57' W (approximately 70 n. miles W of Cape Mendocino, HUM), 27 Jul 1996 (MFo; 1996-141); one was over the Cordell Bank, MRN, 24 Aug 1996 (SBT, MFe; 1996-107); and two were at 33° 39' N, 120° 37' W (approximately 24 n. miles SW of San Miguel I., SBA), 31 Jul 1996 (RLP, SS; 1996-113). The first documented occurrence in California waters was of one approximately 35 n. miles SW of SE Farallon I., SF, 3 May 1992 (not 70 n. miles SW of Point Reyes, MRN, as reported by Howell and Pyle 1997), and it now appears that deep waters off California are at the extreme northeast of this species' pelagic range. As with all records to date, without examining birds in hand, we do not know if the endangered Hawaiian *P. p. sandwichensis* or the nominate Galapagos subspecies is involved.

STREAKED SHEARWATER *Calonectris leucomelas* (7, 1). One 22 miles W of Moss Landing, MTY, 10 Sep 1995 (TE, MB; 1995-121) was on Monterey Bay. A truly lost individual captured far inland in Red Bluff, TEH, 5 Aug 1993 (Garrett and Singer 1998) is the only one found in California away from Monterey Bay.

MANX SHEARWATER *Puffinus puffinus* (22, 10). One was seen from shore at Point Lobos, SF, 4 May 1996 (ASH; 1998-020), one was seen from Pigeon Point, SM, 11 May 1996 (DJP; 1996-077B), and another was seen from this same point 21 Aug 1996 (PJM; 1997-042). On Monterey Bay, one was 1 mile NW of Point Pinos, MTY, 12 Aug 1995 (DR; 1997-057), and up to six were seen in 1996: two 1–3 miles W of Point Pinos, MTY, 21 Sep 1996 (DR; 1997-058); one 5 miles S of Soquel Point, SCZ, 12 Oct 1996 (DR, RMS†; 1997-044); one at an undesignated location on Monterey Bay, MTY, 12 Oct 1996 (LLi‡; 1996-142B); one 3 miles S of Santa Cruz, SCZ, 20 Oct 1996 (JND†; 1997-001); and one 5–10 miles W of Moss Landing, MTY, 20 Oct 1996 (SH, JAT†; 1996-142A). One was seen from shore at Point Piedras Blancas, SLO, 14 Apr 1996 (GPS; 1996-094). With more than twenty records accepted from California waters since 1993 (Erickson and Terrill 1996) and reports from elsewhere along the west coast of North America (Howell et al. 1994, Roberson 1996, *Field Notes* 51:1044), this species is proving to be of regular occurrence in the northeast Pacific.

RED-TAILED TROPICBIRD *Phaethon rubricauda* (18, 6). One of undetermined age was 33 miles W of Point Pinos, MTY, 24 Sep 1994 (JMD†, DLSh; 1994-149), one adult was 46 miles WSW of Rocky Point, MTY, 16 Sep 1995 (BJR†; 1996-078), one adult was at 34° 12' N, 121° 28' W (approximately 60 n. miles W of Point Conception, SBA) 25 Nov 1995 (DMH, KL; 1996-043), one immature was at 32° 41' N, 124° 05' W (approximately 195 n. miles SW of Point Conception, SBA) 10 Oct 1996 (MFo; 1996-144), one calling adult being chased by a Peregrine Falcon (*Falco peregrinus*) was over SE Farallon I., SF, 11 Sep 1996 (PP; 1997-040), and one of unknown age was at 37° 32' N, 126° 17' W (approximately 160 n. miles SW of Pt Arena, MEN) 28 Sep 1996 (MFo; 1996-143).

The original documentation for the bird on 16 Sep 1995 was limited to a single photograph. The date and name of the photographer was added by a Committee member, and the location was stated to be "off Monterey." Although the photograph clearly showed an adult Red-tailed Tropicbird, some members were concerned that the name of the observer, date, and location were "hearsay," so would not endorse the record. Upon being advised that the record was in trouble, the photographer wrote a letter stating he photographed this bird on 16 Sep 1995 while on a Shearwater Journeys trip off Monterey. This is another example of the problems this Committee faces when dealing with a "photo only" record—the Committee needs at a minimum the name of the observer, the date of the observation, and the exact location of the

observation; written comments about the appearance and behavior of the bird are also solicited. Written documentation from others on the trip, along with a specific location, would have made this record much easier to evaluate. The specific location and a photograph are published in *Field Notes* 50:110.

BLUE-FOOTED BOOBY *Sula nebouxii* (75**, 5). One captured at a school in Huntington Beach, ORA, 7 Sep 1990 was taken to a wildlife rehabilitation center where it died (DRW; #LACM 109238; 1994-135). One immature at Mystic L. near Lakeview, RIV, 31 Aug 1996 (MAP; BDS; 1996-108) occurred at the same time that at least three immatures arrived on the Salton Sea, RIV/IMP (AH, CAM†, MAP; JLD, AME, TEv, MFe, GMcC, SJP, MJSanM, FT; 1996-110): one to three at the north end of the sea 1–7 Sep, with one remaining through 6 Oct, and one or two at the south end of the sea 1–7 Sep, with one remaining to 21 Sep.

BROWN BOOBY *Sula leucogaster* (47, 2). One subadult flew N past Point Mugu, VEN, 22 Apr 1995 (DD; 1995-073). One adult female was on SE Farallon I., SF, 10 Oct 1996 (PP†; 1997-037).

RED-FOOTED BOOBY *Sula sula* (12, 1). One subadult at Point La Jolla, SD, 24 May 1996 (PL‡; 1996-079) was initially perched in ornamental bushes at that location, where it had probably spent the night, but flew out over La Jolla Bay before other birders arrived. This is the first to be recorded in San Diego County.

NEOTROPIC CORMORANT *Phalacrocorax brasilianus* (8, 4). One immature moved between the Whitewater R. mouth and the E end of Avenue 67 at the N end of the Salton Sea, RIV, 4 May–1 June 1996 (GMcC, MAP; SJP; 1996-074), two immatures were on the S shore of the Salton Sea near the Salton Sea N. W. R. headquarters, IMP, 27 Apr 1996 (MAP; BDS; 1996-068), an adult was at Obsidian Butte at the S end of the Salton Sea, IMP, 1 Sep 1996 (MAP; CAM, GMcC; 1996-109), and up to three immatures were at Fig Lagoon, 2 miles SW of Seeley, IMP, 23 Apr–14 Jun 1996 (KZK†; TRC, KLG, RL, GMcC, JM, MAP, MMR, MSanM, BDS; 1996-066). These are the first to be found in California in four years (Heindel and Patten 1996) and, like all previous individuals, were in the southeast corner of the state.

GREAT FRIGATEBIRD *Fregata minor* (2, 1). An adult male following the beach from Moss Landing to the Salinas R. mouth, MTY, 13 Oct 1979 (RS, RLB†; 1995-030) was watched by a boatload of birders paralleling the beach. It was seen and photographed 12 years before the female over SE Farallon I., SF (Heindel and Patten 1996) and believed at that time to be this species by the observers, even though published as an "unidentified frigatebird" (*Am. Birds* 34:195). Documentation was not submitted until after the publication of the detailed paper on the identification of Great and Magnificent Frigatebirds (Howell 1994) and acceptance of the SE Farallon I. record.

TRICOLORED HERON *Egretta tricolor* (20**, 5). One immature was at the Tijuana R. mouth, SD, 3 Nov 1995 (GLR; 1996-044), one adult was at Bodega Bay, SON, 17 Sep–1 Oct 1996 (DN†; KB, MFe, SH, JM, BDP; 1996-128), one immature was at Port Hueneme, VEN, 13 Sep–2 Oct 1996 (MES; DD†, CAM, GMcC, WW; 1996-123), and one immature was on the Santa Ana R. in Huntington Beach, ORA, 28 Aug–8 Sep 1996 (MD‡, JEP; 1997-172). One adult was near the Alamo R. mouth at the S end of the Salton Sea, IMP, 2 Mar–1 Apr 1996 (MAP; CAM, GMcC, JM, BDS, SS; 1996-032). This species is a rare but regular fall and winter visitor to coastal San Diego and Orange counties but is irregular farther north. The bird at Bodega Bay was only the third to be found in northern California (*Field Notes* 51:114).

REDDISH EGRET *Egretta rufescens* (73, 5). One immature at Salton City, IMP, 15 Aug 1981 (BSh†; 1997-102) was inland on the Salton Sea, where this species is

irregular. One immature was in Chula Vista, SD, 18–23 Dec 1994 (GMcC; 1995-015A), one immature was in Chula Vista, SD, 9 May–17 Jun 1995 (GMcC; 1995-015B), three adults were at Bolsa Chica, ORA, 10 Jul 1996 (MJSanM; 1996-095), one immature was on the Santa Ana R. in Santa Ana, ORA, 28 Aug–8 Sep 1996 (JEP; 1998-015), and one returning adult was at Imperial Beach, SD, 13 Oct 1996–25 Mar 1997 (GMcC; 1996-145). The latter was the same bird, with a slightly deformed bill, that had spent each winter since the winter of 1982–83 at the Tijuana R. mouth and on south San Diego Bay (Garrett and Singer 1998).

YELLOW-CROWNED NIGHT-HERON *Nyctanassa violaceus* (18, 1). An adult at La Jolla, SD, 1 Apr–1 Jun 1996 (GMcC, JM; 1996-072) was considered to be the same bird first seen in this area in October 1981 (Binford 1985, Erickson and Terrill 1996). A first-summer bird at Fig Lagoon, 2 miles SW of Seeley, IMP, 27 Apr–30 Jun 1996 (MAP; TRC, AME, KZK†, GMcC, MMR, BDS; 1996-067) was the first to be found in the interior of California, although long considered "overdue" at the Salton Sea.

BLACK VULTURE *Coragyps atratus* (2, 1). One frequenting the Arcata area, HUM, 19 Sep 1993–9 Feb 1994 (RC, JLD, DF, GCH, TL†, GMcC, JM, DR†; 1993-141) was associating with Turkey Vultures (*Cathartes aura*). There was never any question as to the identity of this bird, although its age was never determined with certainty. Initially three members questioned the origin of this bird, presenting the same arguments listed by Garrett and Singer (1998) for the Black Vulture at Chico in 1972, but the Arcata record received unanimous approval on the third round. A photograph of the Arcata bird with a Common Raven (*Corvus corax*) was published in *Am. Birds* 48:149.

EMPEROR GOOSE *Chen canagica* (62, 1). One was at Bodega Bay, SON, 12 Dec 1996–30 Apr 1997 (BB, LCo†, MFe, JMa, GMcC, MAP†, MMR†, MJSanM, SBT†; 1996-146).

WHOOPER SWAN *Cygnus cygnus* (4, 2). An adult near the intersection of Interstate 5 and Highway 12, SJ, 16 Dec 1988 (MJL; 1988-289) was originally not accepted on the basis of questionable natural occurrence. The decision was reconsidered after the acceptance of others in California, leading to unanimous approval of this record. One adult at White L. on Lower Klamath N. W. R., SIS, 26–27 Feb 1994 (JRH, DJP; 1994-074) was considered to be the same individual at this location during the winter of 1991–92 (Howell and Pyle 1997). One adult near Grimes, COL, 17 Jan–7 Feb 1995 (SH, JM, DEQ, SCR; 1995-020) and again 3–4 Jan 1996 (JM; 1996-038) was considered to be the same individual. It is possible that all California sightings dating back to the first in 1984, along with those from Summer L. in southern Oregon, may be of the same individual migrating with Tundra Swans (*C. columbianus*) to and from winter grounds in California (Howell and Pyle 1997).

ZONE-TAILED HAWK *Buteo albonotatus* (53, 5). One adult near Weldon, KER, 3 Oct 1994 (TG, SPR; 1995-024) was the second to be recorded in Kern County, but one at Santiago Oaks Regional Park, ORA, 30 Apr 1994 (RAH, DRW; 1994-115) was in the coastal lowlands of southern California where small numbers occur regularly every fall and winter. An adult at Goleta, SBA, 22 Sep 1995–25 Mar 1996 (JEL; 1996-045) and again 24 Oct 1996–22 Mar 1997 (MFe, JM; 1996-147) was considered to be the same bird that has spent each winter there since the winter of 1993–94 (Lehman 1994, Howell and Pyle 1997). An adult in the upper Ojai Valley near Ojai, VEN, 26 Nov 1995–11 Mar 1996 (CAM; 1996-042) was thought to be the same individual present there 6 Sep 1993–8 Mar 1994 (Erickson and Terrill 1996); what was believed to be this same *Buteo* was also reported near Ojai 28 Aug 1994–17 Feb 1995 (*Field Notes* 49:196), but the CBRC has so far received no documentation. One immature at Hermosa Beach, LA, 16 Sep 1996 (KL; 1997-011) and one at Santee Lakes, SD, 10 Jan 1996 (RMS†; 1997-010) were along the southern

California coast. An immature in El Centro, IMP, 4 Dec 1996-22 Feb 1997 (KZK†; GMcC, MAP; 1996-148) is the first to be accepted in Imperial County.

AMERICAN OYSTERCATCHER *Haematopus palliatus* (13, 1). One frequenting the coast of Laguna Beach, ORA, 14 Jan–23 Apr 1996 (RAE, CAM, GMcC, MAP†, DEQ†, MJSanM, BDS; 1996-022) was compared directly with Black Oystercatchers (*H. bachmani*) and a hybrid *H. palliatus* × *bachmani*. On the index provided by Jehl (1985), this bird scored well within the range of *H. p. frazari*.

HUDSONIAN GODWIT *Limosa haemastica* (14, 1). One alternate-plumaged male was at Lower Klamath N. W. R., SIS, 31 May 1993 (BDCW; 1997-033).

RED-NECKED STINT *Calidris ruficollis* (8, 0). One alternate-plumaged adult at the Santa Maria R. estuary, SBA, 28–29 Jun 1995 (JMC†; TME; 1995-083; Figure 1) was considered the same bird as present at this location 11–15 Jul 1994 (Howell and Pyle 1997). A photograph was published in *Am. Birds* 49:980.

WHITE-RUMPED SANDPIPER *Calidris fuscicollis* (13, 1). One female in worn alternate plumage was at Harper Dry L., SBE, 10 Sep 1996 (#SBCM 54881; 1997-074).

CURLEW SANDPIPER *Calidris ferruginea* (21, 3). One in first alternate plumage was at Mountain View, SCL, 1–5 May 1996 (SCR; LCh†, AME, BMcK†, 1996-081). Alternate-plumaged birds were at the Woodland Trestle Ponds, YOL, 5 May 1996 (TMa, JAT; 1997-067) and at the Santa Margarita R. mouth near Oceanside, SD, 10 Jul 1996 (CGE, GHi; PAG, GMcC; 1996-096).

LITTLE GULL *Larus minutus* (64, 6). One first-year bird was at Hollister, SBT, 2–15 Mar 1996 (BM, JCW†; 1996-063). One adult in alternate plumage at China Lake, KER, 4–6 May 1996 (TMi; DVB, MTH, JCW; 1996-097) was the first to be found in the desert portion of Kern County. An adult in basic plumage in Corona, RIV, 8 Nov–13 Dec 1996 (JEP; MAP, WLP; 1996-150) and an adult at nearby Hidden Valley

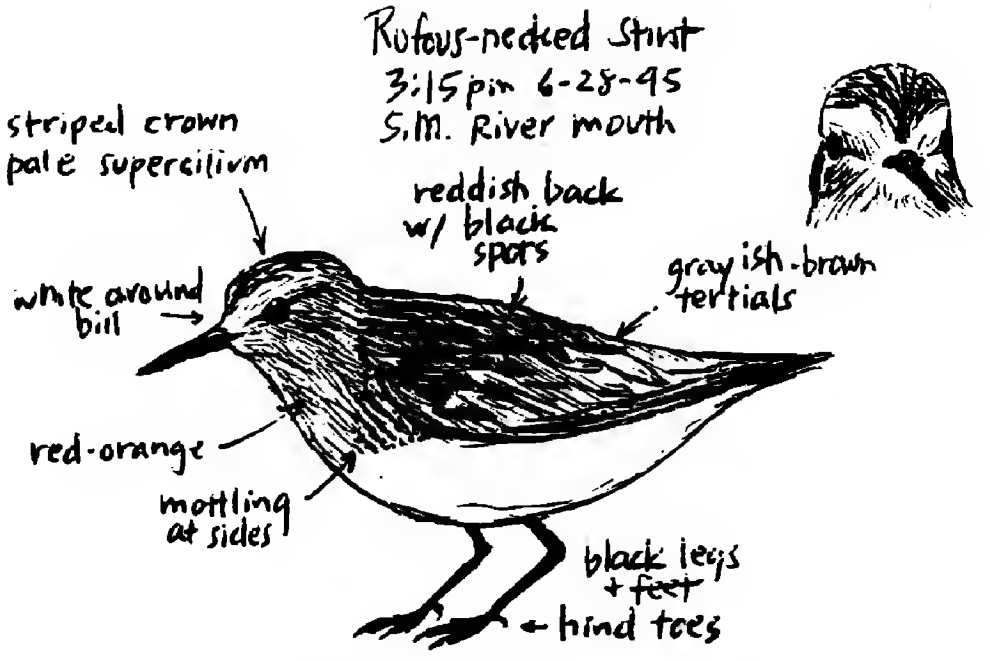

Figure 1. Red-necked Stint, *Calidris ruficollis* (1995-083), Santa Maria River estuary, Santa Barbara Co., 28 June 1995. This adult in alternate plumage was believed to be the same individual at this location the previous year.

Sketch by Jamie M. Chavez

Wildlife Area, RIV, 2 Feb–27 Mar 1997 (GMcC, CFT; 1997-076) were considered to be the same bird. Reports from the north end of the Salton Sea, RIV, in 1996 were judged to involve three or four individuals: one adult in basic plumage at the E end of Avenue 76 on 2 Mar 1996 (GMcC; TRC; 1996-033), two adults in alternate plumage at the same location 13 Apr 1996, with one still present 21 Apr 1996 (GMcC; AS; 1996-073), and one adult in basic plumage at the nearby Whitewater R. mouth 27 May 1996 (MSanM, MJSanM; 1996-082). The species is proving to be of annual occurrence at the Salton Sea.

BLACK-HEADED GULL *Larus ridibundus* (20, 1). One first-year bird flew north past Pigeon Point, SM, 20 Apr 1996 (RST; 1996-083). One adult in Santa Barbara, SBA, 30 Dec 1994–1 Feb 1995 (JEL; 1995-051) and again 26 Nov 1996–28 Feb 1997 (LCo; GMcC, JM, RMS†; 1997-015) was considered a returning bird, having been present the intervening winter (Garrett and Singer 1998). A photograph of the Santa Barbara bird was published in *Field Notes* 49:198.

LESSER BLACK-BACKED GULL *Larus fuscus* (9, 1). One adult in Brawley, IMP, 22–27 Jan 1996 (PEL; TRC, SEF, GMcC, MAP, BDS; 1996-021) was the fifth to be found around the Salton Sea, and like all previous gulls of this species in California showed the characteristics of the pale race *graellsii*. One adult at Doheny State Beach, ORA, 18 Dec 1995–20 Mar 1996 (CAM; 1996-019) and again 8 Dec 1996–5 Jan 1997 (JDW†; 1997-073) was considered the same bird at this location during the winter of 1994–95 (Howell and Pyle 1997). An adult in Oceanside, SD, 22 Feb–2 Mar 1996 (PAG; GMcC, KAR†, JWS†; 1996-034) was also considered the same bird as that at Doheny State Beach, having moved 25 miles south along the coast. A photograph of the bird in Oceanside was published in *Field Notes* 50:222.

SWALLOW-TAILED GULL *Creagrus furcatus* (1, 1). An adult in alternate plumage seen at 37° 37′ N, 123° 28′ W (approximately 15 n. miles W of SE Farallon I., SF) 3 Mar 1996 (LSp; 1996-039), by an observer with extensive prior experience with this species, is the first to be accepted as a naturally occurring bird in California. A similarly plumaged adult photographed in Pacific Grove and at nearby Moss Landing, MTY, 6–8 Jun 1985 was considered by the Committee to be of questionable origin (Heindel and Garrett 1995). However, with the acceptance of the 1996 record, the acceptability of the 1985 bird will be reconsidered. This species has been reported north to Panama (Ridgely 1976, Reed 1988), but there is no previous unquestioned record in the United States (AOU 1998).

RED-LEGGED KITTIWAKE *Rissa brevirostris* (1, 1). One adult (one or two retained dark coverts might suggest a subadult) captured 13 miles inland at an apartment complex in Anaheim, ORA, 28 Feb 1996 was taken to a wildlife rehabilitation center where it died 15 Mar 1996 (#LACM 109199; 1996-069; Figure 2). Because seven individuals have been found in Oregon (Gilligan et al. 1994), and a truly lost bird was captured in Nevada 3 Jul 1977 (Alcorn 1988), this species was anticipated in California. With this bird being inland at the southern end of the state, the possibility of human assistance was considered. All but one member, however, felt that natural occurrence was more likely than human assistance.

IVORY GULL *Pagophila eburnea* (1, 1). One first-winter bird at Doheny State Beach in Dana Point, ORA, 5 Jan 1996 (JDW†; JA†, NBB, TRC, RAE, RAH, IH, C-TL†, LLe, GMcC, MSanM, CR; 1996-012) was the first to be found in California. This establishes the southernmost record for this species in North America (AOU 1998), and no others have been found farther south in Europe (Cramp 1993) or Asia (Brazil 1991). The Ivory Gull is more common in the North Atlantic than in the North Pacific. It is rare south of St. Lawrence I. in Alaska, with only one recorded in coastal British Columbia (Campbell et al. 1990) and another reported in northern Washington (Roberson 1980 but considered hypothetical by Wahl and Paulson 1987).

Figure 2. Red-legged Kittiwake, *Rissa brevirostris* (1996-069), found in Anaheim, Orange Co., 28 February 1996 and taken to Pacific Wildlife Project, where it died 15 March 1996. The specimen is retained in the Natural History Musem of Los Angeles County (LACM 109199) and represents the first record for California.

Photo by Kimball L. Garrett

Therefore one in southern California was totally unexpected. Weintraub and San Miguel (1999) provided a full account of this record, including photographs; a photograph also appeared in *Field Notes* 50:224.

SANDWICH TERN *Sterna sandvicensis* (3, 0). An adult paired with an Elegant Tern (*Sterna elegans*; Collins 1997) at Bolsa Chica, ORA, 24 Jun–17 Jul 1995 (CTC†; CAM; 1995-071) and again 15 Jun–21 Jul 1996 (NBB; 1996-090) was considered the same bird first seen at this location during the summer of 1991 (Patten et al. 1995).

SOOTY TERN *Sterna fuscata* (6, 3). An adult at Bolsa Chica, ORA, 6 Jun–24 Aug 1996 (NBB, RL, CAM, GMcC, JM; 1996-084) was considered the same bird that was with the nesting Elegant Terns at this location during the summer of 1995 (Howell and Pyle 1997) and first seen there in 1994 (Erickson and Terrill 1996). An adult was at the Santa Margarita R. mouth, SD, 6 Jul 1996, and a copulating pair was there the following day (BF†; GMcC; 1996-091). What was possibly the same pair that was at the Santa Margarita R. mouth joined the summering adult at Bolsa Chica 19–24 Jul 1996 (CAM; 1996-119). An adult was at Doheny State Beach in Dana Point, ORA, 30 Jul 1995 (TR; 1995-089). A photograph of the pair at the Santa Margarita R. mouth was published in *Field Notes* 50:997.

WHITE-WINGED TERN *Chlidonias leucopterus* (1, 1). An adult in alternate plumage in Arcata, HUM, 20–26 Jun 1996 and again 27–30 Aug 1996 (NBB, MM, CAM, GMcC, JM, BDP, DR†, MMR†, MSanM; 1996-085; Figure 3) could not be found on the intervening dates. This tern is a very rare to casual straggler along the Atlantic coast of North America (AOU 1998), with records from as far inland as Wisconsin (Robbins 1991). However, the Arcata bird is only the fourth to be found on the west coast of North America, the other three having been in Alaska (*Am. Birds* 47:135 and *Field Notes* 48:331).

THICK-BILLED MURRE *Uria lomvia* (35, 1). One in basic plumage in Monterey, MTY, 11–16 Feb 1996 (DR, MMR; 1996-102) was in the area where most of California's Thick-billed Murres have been found.

RUDDY GROUND-DOVE *Columbina talpacoti* (64, 3). A male at Furnace Creek Ranch, Death Valley, INY, 12 Oct–2 Nov 1996 (GMcC; JH, TH; 1996-151A) and a female there 21 Oct 1996 (MSanM; 1996-151B) were both at a location where this species has become expected in fall, but one in Ridgecrest, KER, 6–15 Nov 1996 (DVB; 1996-152) was the fifth to be found in that county.

BLACK-BILLED CUCKOO *Coccyzus erythropthalmus* (14, 2). One at Fairhaven, HUM, 19 Sep–2 Oct 1996 (DF, GCH; 1997-056) was considered by some on the Committee to be an immature and was the third recorded in Humboldt County. An adult was collected at San Nicolas Is., VEN, 18 Aug 1996 (WW; MAP†; #SBMNH 6446; 1996-104). The only previous specimen from California is of a corpse found at Humboldt Bay. Another specimen thought to have been collected in Fresno in March 1918 was questioned by the Committee (Garrett and Singer 1998). The 18 Aug date establishes the earliest for California. Previously the earliest record was of one banded on SE Farallon I. 26 Aug 1987. Most Black-billed Cuckoos depart their breeding range early, so it is not surprising that the 18 Aug to 18 Oct date span for this species in California is earlier than for most vagrants. All 14 records are for fall.

BUFF-COLLARED NIGHTJAR *Caprimulgus ridgwayi* (1, 1). A male captured in Oxnard, VEN, 8 Jun 1996 was given to a wildlife rehabilitation center where it died 6 July 1996 (DD†; #LACM 109297; 1996-120; Figure 4). This bird lost its tail feathers while in the rehabilitation center, but the feathers were saved and deposited with the body at the Los Angeles County Museum. The species breeds in western Mexico (Howell and Webb 1995), abundantly in Sonora (Russell and Monson 1998), with the northern limit being in extreme southeastern Arizona (Monson and Phillips 1981) and southwestern New Mexico (Hubbard 1978). The population in the United States and Sonora withdraws southward in winter. This species was certainly an unexpected addition to the California list.

BROAD-BILLED HUMMINGBIRD *Cynanthus latirostris* (50, 4). Males were at Pismo Beach, SLO, *16 Nov 1995* (LSu, SSu†; 1996-048), Santa Barbara, SBA, 15–22 Nov 1995 (AB†; 1996-047), Santa Rosa, SON, 14 Jan 1996 (DAH†, RR, BDP; 1996-062), and Desert Center, RIV, 20–21 Oct 1996 (CMcG; 1996-153). Several CBRC members expressed their disappointment about the lack of detail accompanying the photograph of the Santa Barbara bird, and we encourage birders to provide at least a minimum amount of information even when the identity of the photographed bird seems obvious. The vast majority of records are of coastal vagrants.

VIOLET-CROWNED HUMMINGBIRD *Amazilia violiceps* (4, 1). One visited Cape Honeysuckle (*Tecomaria capensis*) at a residence in east Carlsbad, SD, 13 Nov–3 Dec 1996 (TRC, AME, MFe, RL, GMcC, JM, MAP, RMS†, MSanM, PZ, JOZ; 1996-154). A photograph of this bird appeared on the cover of *Western Birds* 29 (2), 1998. The first record in California was at Santa Paula, VEN, 6 Jul–late Dec 1976 (Luther et. al. 1979), the second in Bouquet Canyon, LA, 25–29 May 1987 (Pyle and McCaskie 1992), and the third at Kenwood, SON, 26–29 Mar 1992 (Heindel and Patten 1996).

GREATER PEWEE *Contopus pertinax* (31, 1). One in Saticoy, VEN, 21 Jan–21 Feb 1995 (JLD, JTi; 1995-039) was accepted on the first round and was the first recorded in Ventura County.

EASTERN WOOD-PEWEE *Contopus virens* (4, 1). A calling individual was in Huntington Beach, ORA, 31 Oct–6 Nov 1996 (BEDa; TRC, MD‡, KLG, LLe†, GMcC, MAP, MJSanM, MSanM, LSa†, JOZ; 1996-155; Figure 5). Vocalizations are

perhaps the only certain way to distinguish this species in the field from the Western Wood-Pewee (*C. sordidulus*), and most of the reports in this record focused on this important distinction. The voice was variously described as a *peee-a-weeee* or *pee-ur-weeee*, which is distinctive and diagnostic for the Eastern Wood-Pewee. The photographs submitted clearly showed the all-yellowish-orange mandible, and this field mark combined with the vocalizations led to unanimous first-round acceptance. It is likely that Eastern Wood-Pewees are overlooked because of the difficulty of identification, and, perhaps for this reason, this species remains very rarely reported in California. The first recorded in California was banded on SE Farallon Is., SF, 15 June 1975 (Luther 1980), the second was a singing bird in San Joaquin City, SJ, 18 Aug–17 Sep 1983 (Morlan 1985), and the third was a singing bird on Big Pine Mountain, SBA, 24 Jun–9 Jul 1994 (Pyle and Howell 1997).

YELLOW-BELLIED FLYCATCHER *Empidonax flaviventris* (7, 1). An immature female observed, then captured and banded, at San Nicolas I., VEN, 27–28 Sep 1996 (MAP; WW†; 1996-124; Figure 6) was the first for Ventura County. The wing chord and tail were carefully measured to yield a wing length minus tail length difference of 11.2 mm, well within the range of this species (DeSante et al. 1985; Figure 7). This and other wing-formula features eliminate the Western (*E. difficilis sensu lato*) and Acadian (*E. virescens*) Flycatchers. The bird's skull was 50% pneumatized, with the relatively fresh plumage, indicating a juvenile. The 60 mm wing chord is too short for a male (Pyle 1997). Of previous records, one is for Galileo Hill Park, KRN, 27 Sep–1 Oct 1989 (Patten and Erickson 1994), the remainder from the coast. Two additional records from eastern Kern County in 1997 have been accepted and will be treated in the next report, and another found in September 1998 will soon begin circulating through the Committee.

DUSKY-CAPPED FLYCATCHER *Myiarchus tuberculifer* (38, 2). One was at Pine Lake Park, SF, 30 Nov 1996–1 Mar 1997 (DM, HC; EG† SH, JMa, JM, SBT; 1997-005), and another was at Laguna Creek Beach, SCZ, 14 Dec 1996–19 Jan 1997 (JND; GEC, BMc †; 1997-004). The plaintive *pweeerrr* call, so useful in identifying this species, was well described in both records. These late-fall arrival dates and overwinter stays are typical of the Dusky-capped Flycatcher in California.

GREAT CRESTED FLYCATCHER *Myiarchus crinitus* (40, 2). One at Newport Beach, ORA, 25 Sep 1995 (JEP; 1998-013) was not submitted to the Committee until over two years after it was seen but was sufficiently documented for first-round acceptance. Another was near California City, KER, 4 Oct 1996 (JLD†, STa; MTH†; 1996-156). The description and photographs clearly show a dark gray breast (not pale or whitish gray), contrasting sharply with the bright yellow belly, and broad white outer tertial edging. This represents only the fourth inland record and the second for Kern County.

THICK-BILLED KINGBIRD *Tyrannus crassirostris* (13, 0). One returned to Pomona, LA, and wintered from 9 Sep 1996 to 2 Mar 1997 for its fifth consecutive year (MSanM; TPB, KB, MFe, SH, JMa, JM, GMcC, SBT, SW; 1996-157). Its occurrence in the first winter was not supported with documentation (Garrett and Singer 1998).

*SCISSOR-TAILED FLYCATCHER *Tyrannus forficatus* (97, 3). One was at Carbon Canyon Dam, ORA, 23–27 Oct 1995 (MD‡; 1997-173). Another was at Moss Beach, SM, 5 Sep 1996 (DJK; 1997-054), and an adult male was at Zuma Canyon, LA, 28 April 1996 (RW; HB, TK, NP†; 1996-098). Records after 31 Dec 1997 are no longer reviewed.

YELLOW-THROATED VIREO *Vireo flavoviridis* (62, 7). A sonogram prepared from a tape-recorded bird observed at Lincoln Park, SF, 31 May 1994 (ASH§; 1998-021) matched known vocalizations of the species. One was at Carpinteria Creek,

SBA, 6–15 Oct 1995 (JEL; 1996-052), another was in Laguna Canyon, ORA, 27 May 1995 (JEP; 1998-012), another was at MacKerricher State Park, MEN, 14–15 Sep 1996 (CEV; BEDo, PBS, JW; 1996-167), and a singing bird was at Point Reyes, MRN, 26 May 1996 (LLi; 1996-087). Others were in Wilmington, LA, 20 Sep–5 Oct 1996 (MSanM, TEW; TK, KL†; 1996-168) and Huntington Beach, ORA, 5–6 Oct 1996 (TEW; MSanM 1996-169).

PHILADELPHIA VIREO *Vireo philadelphicus* (98, 2). One thought to be an immature was at Pine Gulch Creek, Bolinas, MRN, 6 Oct 1996 (RS, LLi; 1996-135). One was at Galileo Hill Park, KER, 6–12 Oct 1996 (JLD, MTH†; GMcC, MJSanM; 1996-170).

YELLOW-GREEN VIREO *Vireo flavoviridis* (48,5). One at the Carmel River mouth near Mission Ranch, MTY, 5 Oct 1996 (BH; 1997-051) was considered the same as one at the Carmel River mouth, MTY, 28 Sep–14 Oct 1996 (RF; RC, LJE, DR, CAM, GMcC; 1996-172). An immature was at the Big Sur River mouth, MTY, 22–28 Sep 1996 (JND†; CHo, DR; 1997-006), and one was in lower Zuma Canyon, LA, 14 Oct 1995 (KLG†; 1996-053). Without the thorough description included with the latter record, certainty about the identification would have been difficult. This demonstrates the importance of good documentation, even with photographic evidence, in reports submitted to the CBRC. One was at Point Loma, SD, 6 Sep 1996 (DWA; PAG, GMcC; 1996-127). This is two days earlier than previously accepted reports and establishes 6 Sep–30 Oct as the date span for this species. One was at Point Loma, SD, 20 Sep–10 Oct 1996 (PAG; GLR, GMcC; 1996-173).

BLUE JAY *Cyanocitta cristata* (10, 1). One visited a feeder at Sea Ranch, SON, for "3 to 4 weeks" in February 1992 (BRV†; 1995-80; Figure 8). The record was not submitted until three years after the fact but was nonetheless accepted unanimously on the first round.

CAVE SWALLOW *Petrochelidon fulva* (3, 2). One was found at Sheldon Reservoir, 4.5 mi. NW of Imperial, IMP, 6 May 1995 (GMcC, PAG; TRC; 1995-046). Two weeks later another was at the Wister Unit, Imperial Wildlife Area, IMP, 21 May 1995 (MAP; BDS; 1995-054). The Committee evaluated the possibility that these two sightings could have been of the same bird, but because of the 15 days and 26 miles separating the two occurrences, most on the Committee considered them different. The first record for California was near the mouth of the New River, IMP, 8 Aug 1987 (Patten and Erickson 1994).

ARCTIC WARBLER *Phylloscopus borealis* (2, 1). A well-documented bird was at Pismo Beach, SLO, 28 Sep–1 Oct 1996 (BEDa; NBB, JLD, RL, CAM, JMa, GMcC, BMcK†, JM, DR, MSanM, BSc†, GPS†; 1996-158; Figure 9) and unanimously accepted on the first round. The only other Arctic Warbler in California was one banded and photographed at Big Sur, MTY, 13 Sep 1995 (Garrett and Singer 1998). Remarkably, before either California record, one had been recorded on the Vizcaíno Peninsula, Baja California Sur, 12 Oct 1991 (Pyle and Howell 1993).

NORTHERN WHEATEAR *Oenanthe oenanthe* (9, 1). An immature, so identified by scaling in the back and rusty-edged coverts (Pyle 1997), was in Sebastopol, SON, 17–26 Sep 1996 (DN, BDP, ANW; JMa, JM; 1996-132). A photograph appeared in *Field Notes* 51:116. Most wheatears in California have been observed for only one day, so it is unusual that this bird stayed for ten. The tail pattern as described ruled out other species of wheatears, but whether the bird was *O. o. oenanthe* or *O. o. leucorhoa*, the larger race from Greenland and Iceland, was left undetermined.

WOOD THRUSH *Hylocichla mustelina* (12, 3). One was at the Cosumnes River Preserve, SAC, 7–10 Jun 1996 (JAT§; KCK; 1996-134). Another was banded and released at the Sagehen Field Station near Truckee, NEV, on 19 Jun 1996 (JK; 1997-

031). In-hand data, including length and wing chord, convinced the Committee the identification was correct. Unfortunately, photographs, which would have verified the identification further, were not taken. Banders and others handling rarities are encouraged to take photographs to accompany their reports. Another was at Mountain Home Village, SBE, 21–26 Dec 1996 (MFe, GMcC, MSanM; 1996-161). Most California Wood Thrush records are for late spring and fall, making the late December date unusual.

RUFOUS-BACKED ROBIN *Turdus rufopalliatus* (8, 1). One in Borrego Springs, SD, 16 Mar–16 Apr 1996 (KE; TRC, PAG, GCH, RL, CRM, GMcC, JM, DEQ, MAP, MSanM, BDS, BMS; 1996-061) was the first record for San Diego County of a species long anticipated.

GRAY CATBIRD *Dumetella carolinensis* (81, 10). One was at Point Reyes, MRN, 18–27 Sep 1996 (KB; MFe, LLi‡, JM, BDP; 1996-129), and another was on SE Farallon I., SF, 29 Oct–2 Nov 1996 (PP†; 1997-034). Remarkably, three were banded and photographed at one location during the summer of 1996: a one-year-old bird was at Big Sur River Mouth, MTY, 13–18 Jun 1996 (DR†; 1996-086), another 17 Jun–2 Jul 1996 (DR; 1996-125), and a third 2–18 Jul 1996 (SB; 1996-126). Others were at Panamint Springs, INY, 29 May 1996 (JM; 1996-101), Arroyo de la Cruz Creek, SLO, 29 Sep 1996 (GPS; 1996-130), Big Sycamore Canyon, VEN, 19 Oct 1996 (TRC, GMcC; 1996-159), Desert Center, RIV, 16–17 Nov 1996 (WJM; MAP; 1996-160), and Costa Mesa, ORA, 22 Dec 1996–19 Feb 1997 (JEP; RL, MJSanM; 1996-041). The majority of records are of coastal vagrants.

YELLOW WAGTAIL *Motacilla flava* (10, 1). One at Arcata, HUM, 27 Aug 1996 (DF; EE; 1996-162) was the second for Humboldt County and extends the species' period of occurrence in California 10 days earlier than previously accepted records.

BLACK-BACKED WAGTAIL *Motacilla lugens* (8, 2). An adult was at Caspar Creek State Beach, MEN, 27–30 Sep 1996 (JW; KKC, MD‡, GEC, BEDo, DE†, BK; 1996-163). A remarkably well documented immature male was along lower San Juan Creek, Dana Point/San Juan Capistrano, ORA, 25 Jan–12 Apr 1996 (TR, CAM, MAP; TRC, MD, SRG, GCH, RL, GMcC, JM, DEQ, WLP, RMS, MJSanM, MSanM, BDS, JHT, JDW†; 1996-023). The Committee's decision regarding identification was greatly simplified by the thorough documentation, which included a daily chronicle of the bird's activities. During the first few days of this bird's stay, it was uncertain whether it was *M. alba* or *M. lugens*, but a few astute observers had determined early that it was a Black-backed Wagtail. Initially some thought the bill was small, indicating a female but as the bird molted it revealed itself a male. Descriptions and photographs spanning most of the period the bird was present show the back changing from gray with a few black feathers to completely black. The inner tertials were retained juvenile feathers, indicating the bird was in its first year. This constitutes the first record for Orange County and the southernmost for California. One adult male at Doheny State Beach, ORA, 27 Sep–7 Oct 1996 (JDW†; JLD, MSanM, MJSanM; 1996-164) was considered to be the same bird returning from the previous year. Its sudden disappearance, when it appeared to have settled in to spend a second winter, suggested possible predation (*Field Notes* 51:121). Sibley and Howell (1998) analyzed and discussed the identification of Black-backed and White Wagtails thoroughly.

SPRAGUE'S PIPIT *Anthus spragueii* (25, 2). One at China Lake Naval Station, KER, 20–22 Oct 1996 (DVB†; MTH; 1996-166) made the first record for Kern County. Another was at San Joaquin Marsh, ORA, 19–20 Oct 1996 (BEDa; LB†, RAH, MTH†, MJSanM, MSanM; 1996-165).

GOLDEN-WINGED WARBLER *Vermivora chrysoptera* (55, 1). A female was at Atwater near the Los Angeles River, LA, 1–3 Mar 1996 (DM; KLG, CAM, MSanM; 1996-040). The early March date suggests the bird had probably spent the winter.

GRACE'S WARBLER *Dendroica graciae* (32, 1). Excursions by several groups to Clark Mountain in northeastern San Bernardino County 22 May–14 Jun 1995 yielded at least one male (MSanM; DVB†, MAP, BDS, SBT; 1995-059); a female there 3 June 1995 was reported previously (Garrett and Singer 1998). Some parties heard vocalizations that quite possibly were from another male Grace's Warbler, but the documentation submitted to the Committee was ambiguous. Over the years a number of parties have made the difficult hike into the White Fir (*Abies concolor*) forest of Clark Mountain looking for Grace's Warblers, producing seven of the accepted records for California. Though long suspected, breeding has never been confirmed there.

WORM-EATING WARBLER *Helmitheros vermivorus* (80, 1). One at Point Loma, SD, 12 Oct 1995 (DWA; 1996-057) was reported as an adult. With current knowledge, it is not possible to determine age of fall birds unless skulling, plumage measurements, or other in-hand techniques are used (Pyle 1997).

CONNECTICUT WARBLER *Oporornis agilis* (78, 1). One was on SE Farallon I., SF, 1 Oct 1995 (CA, PP; 1995-139). This was the fourth Connecticut Warbler recorded on the island during fall 1995; the other three were covered by Garrett and Singer (1998).

MOURNING WARBLER *Oporornis philadelphia* (97, 4). Well-described birds were at Stinson Beach, MRN, 15 Sep 1993 (SNGH; 1998-009) and at Bolinas, MRN, 30 Sep 1993 (SNGH; 1998-010). A bird found at the Fitzgerald Marine Preserve near Moss Beach, SM, 1 Oct 1996 (SBT; 1996-136) was the first for San Mateo County. An immature was at the Carmel River mouth, MTY, 11–13 Oct 1996 (AME, MFe, DR; 1996-137).

RED-FACED WARBLER *Cardellina rubrifrons* (10, 1). One was at Point Loma, SD, 29 May 1996 (PAG; 1996-099). Of the ten state records, eight are for spring, two for fall.

SCARLET TANAGER *Piranga olivacea* (92, 3). A female in Wilmington, LA, 23–27 May 1994 (DMH; KL, RAH; 1994-100) was accepted on the third round of voting. In the first two rounds many members thought the details insufficient to uphold the record, but subsequent additional detail and an additional corroborating report brought unanimous support. Another female, which came aboard a research vessel south of San Clemente I., LA, (32° 20'N, 118° 30'W) 9 Oct 1993 (RRV: 1994-043) was finally accepted on the fourth round of voting. An immature male was on San Clemente I., LA, 17 Oct 1996 (GMcC; 1996-176).

SMITH'S LONGSPUR *Calcarius pictus* (4, 1). What was considered to be an immature male was at Galileo Hill Park, KER, 10 Oct 1996 (DVB; BSm†, GHa, AH; 1996-138). The entirely buffy underparts with streaking and white spot at the back of the auriculars are diagnostic for this species. Age and sex were determined by the buffy edges on the primary and secondary coverts and the tertials. It was the first to be found in southern California. Dunn and Beadle (1998) provided an excellent discussion of the identification of this and other longspurs and included two photographs of this individual.

RUSTIC BUNTING *Emberiza rustica* (4, 1). An individual discovered during the Willow Creek CBC in Hoopa, HUM, 23 Dec 1995 remained until 3 Feb 1996 (TAC, JLD, KLG, RL, CAM, JM, GMcC, WLP, DEQ, MMR†, RR, MSanM, DLSh; 1996-008). Poorly documented reports of a second bird at this location were discussed but dismissed by the Committee.

PYRRHULOXIA *Cardinalis sinuatus* (13, 1). An adult male was in El Centro, IMP, 28 May–5 Jun 1996 (CGE; 1996-122). Not surprisingly, most records of this species

Figure 3. White-winged Tern, *Chlidonias leucopterus* (1996-085), at Arcata, Humboldt Co., 25 June 1996; the first in western North America outside Alaska.

Photo by Don Roberson

are from desert locations in southern California, with one exceptional record for San Miguel Is., SBA, 13–19 June 1990 (Heindel and Garrett 1995). Accepted records extend from 18 Dec to 22 Jul.

PAINTED BUNTING *Passerina ciris* (54, 4). An immature male with a badly worn tail in the Tijuana R. valley, SD, 24 Aug 1993 (DWA, CHR; 1994-045) was finally accepted on the third round. Like so many previous male Painted Buntings that have not been accepted because of the possibility of escape from captivity, this bird was initially considered suspect, but comments from Pyle suggested that because males retain juvenile rectrices well into the fall, it is normal for their tails to be worn in August. One at Huntington Beach, ORA, 4 Sep–24 Oct 1994 (CAM; 1994-150) was seen by many observers, but only one report was received. This bird's ragged appearance was attributed by some on the Committee to cage wear but others, as in the preceding record, argued this condition could be due to normal plumage wear. The record was finally accepted on the third round. Another was in California City, KER, 1 Sep 1996 (MTH; 1996-177), and one was in Huntington Beach, ORA, 15 Sep 1996 (JEP; 1998-016). Understanding molt sequences and timing is essential to assessing the age and sex of birds in the field accurately, and observers are encouraged to use the ever-expanding literature dealing with that subject, especially Pyle (1997).

COMMON GRACKLE *Quiscalus quiscula* (36, 2). A male at Iron Mountain, SBE, 11 Oct 1984 (RLMcK†; 1996-139) was accepted even though over 13 years had elapsed from when the bird was observed. In spite of the lengthy delay in submitting this documentation, the photographs and accompanying description were sufficient for unanimous first-round acceptance. Another was at Canebrake, KER, 22–28 Oct

1995 (DLaB†; MOC; 1996-060). All of the Common Grackles in California have been of the bronzed form *Q. q. versicolor*.

STREAK-BACKED ORIOLE *Icterus pustulatus* (6, 1). One was at Bartlett Park, Huntington Beach, ORA, 29 Dec 1996–27 Mar 1997 (JEP; MFe, KLG, KCK, CAM, JMa, JM, GMcC, MAP, PPi, RWR, MJSanM, MSanM†, BSm†, MET†, SBT, CFT, JAW, JOZ; 1996-178). A photograph appeared in *Field Notes* 51:805. We appreciate the several reports from out-of-state birders. The last record of this species was of one at Gene Pumping Plant, near Parker Dam, SBE, 9–18 Dec 1991 (Patten et al. 1995). All records of this species in California (including one collected at Lake Murray, San Diego, SD, 1 May 1931; Huey 1931) are thought to represent *I. p. microstictus* from northwestern Mexico.

RECORDS NOT ACCEPTED, identification not established

ARCTIC LOON *Gavia arctica*. In general Committee members are reluctant to endorse records of extreme rarities with common similar relatives without some confirmation from other observers or photographs. One reported by a single observer at Bodega Bay, SON, 16 Nov 1996 (1996-140) received little support.

YELLOW-BILLED LOON *Gavia adamsii*. Photographs of a large loon at the harbor in Ventura, VEN, 3 Jan 1995 (1996-029) were not accompanied by written documentation and were not of sufficient quality to convince all members of the bird's identity. We once again encourage reporters to submit written documentation with photographs.

DARK-RUMPED PETREL *Pterodroma phaeopygia*. A light-bodied *Pterodroma* seen from SE Farallon I., SF, 20 May 1988 (1997-131) was identified as this species nine years after the observation. The record was endorsed by four members; the remaining six felt the bird was most likely a Dark-rumped Petrel but considered the documentation inadequate to support a first North American record.

GREATER SHEARWATER *Puffinus gravis*. A shearwater seen in the Gulf of the Farallones, SF, 15 Oct 1995 (1995-123) may have been this species. However, inconsistencies in the documentation persuaded virtually all members to treat the report with caution and refrain from endorsing the record.

MANX SHEARWATER *Puffinus puffinus*. The documentation for a small black and white shearwater seen briefly from SE Farallon I., SF, 13 Sep 1996 (1997-041) was considered inadequate to support the record. This shearwater was seen closer, and for a longer period, by an observer from Great Britain familiar with this species. However, the British observer failed to provide documentation.

MASKED BOOBY *Sula dactylatra*. The documentation for a black and white booby at San Miguel I., SBA, 11 Jan 1993 (1994-059) was insufficient to support the identification as a Masked Booby. The written account of the observation and the drawing of the bird were prepared more than one year after the sighting. Most Committee members question the accuracy of such documentation. In this case, the drawing shows black on the secondaries extending to and including the tertials, but the written account does not address this crucial point, and the observer did not state why the bird was not a Red-footed Booby.

BLUE-FOOTED BOOBY *Sula nebouxii*. The description of a booby seen perched on E Anacapa I., VEN, 31 Aug 1995 (1994-208) was inadequate to establish the identity to species.

RED-FOOTED BOOBY *Sula sula*. An all-dark booby photographed 5.5 miles S of Soquel Point, SCZ, 10 July 1996 (1996-103) was believed by the observer to be this

species. However, most Committee members felt a young Brown Booby could not be eliminated, so the record was not accepted.

ANHINGA *Anhinga anhinga*. Two were reported soaring high above Westminster, ORA, 2 Nov 1994 (1995-023), but all Committee members felt the documentation was inadequate to support such a significant record. Captive African Darters (*A. melanogaster rufa*) are on display in California at such places as the San Diego Wild Animal Park and have the potential to escape. Therefore reports of the Anhinga should include enough detail to eliminate the other species of *Anhinga*.

YELLOW-CROWNED NIGHT-HERON *Nyctanassa violaceus*. One reported at Playa del Rey, LA, 15 Apr 1995 (1995-075) lacked documentation adequate to persuade most Committee members to endorse the record.

BAR-HEADED GOOSE *Anser indicus*. The documentation for a goose reported at Lower Klamath N. W. R., SIS, during the week of 18 Mar 1959 (*Audubon Field Notes* 13:311, Wilbur and Yocum 1971, Cogswell 1977; 1993-104) was inadequate to support the identification as a Bar-headed Goose. Furthermore, most agreed that if it were correctly identified, it was most likely an escaped bird. There are no accepted records of this species in North America, and it is common in captivity.

TRUMPETER SWAN *Cygnus buccinator*. Three swans seen only in flight at Modoc N. W. R., MOD, 7 Feb 1993 (1997-199) and a swan seen near Grimes, COL, 7 Feb 1995 (1995-022) were identified primarily on the basis of the green neck collars they were wearing. The Committee has conflicting information on whether green collars have been placed only on Trumpeter Swans or on both Trumpeter and Tundra (*C. columbianus*) Swans. If it were proven that green collars have been placed only on Trumpeter Swans, the Committee would then face the problem of "viable population not established," since many of these marked swans originate from highly managed transplanted populations (see discussion below).

KING EIDER *Somateria spectabilis*. A dead duck photographed on the beach in San Francisco, SF, 26 Dec 1995 (1997-030) as part of the Gulf of the Farallones National Marine Sanctuary Beachwatch Program was identified as this species. The coloration on the underparts clearly shows it was not a young male King Eider as identified but more likely a Gadwall (*Anas strepera*).

MISSISSIPPI KITE *Ictinia mississippiensis*. The documentation for one reported in Bishop, INY, 20 June 1994 was inadequate to persuade half the voting members to endorse this record.

AMERICAN OYSTERCATCHER *Haematopus palliatus*. Two black-and-white oystercatchers at Crystal Cove State Park/Laguna Beach, ORA, 3–5 Sep 1995 (1996-028) were given a score of 18 by one of the observers using Jehl's (1985) character index, so they were considered hybrid *H. palliatus* × *bachmani* by the Committee.

SPOTTED REDSHANK *Tringa erythropus*. A *Tringa* seen at Winchester, RIV, 28 Sep 1996 (1996-131) was reported to look like a yellowlegs but to have red legs. It was never seen in flight or heard calling. Most Committee members felt a record of such a rarity should be supported by a description that at a minimum included the extent of the white on the back and rump.

BAR-TAILED GODWIT *Limosa lapponica*. A godwit at San Elijo Lagoon, SD, 27 Aug 1995 (1996-046) may have been this species, but a majority of the Committee did not believe that a pale Marbled Godwit was eliminated.

RED-NECKED STINT *Calidris ruficollis*. The documentation for one reported at the Santa Maria R. mouth, SBA, 31 Aug 1996 (1997-013) was considered by all to be inadequate to support the identification. Observers are cautioned that the Committee has consistently required detailed documentation that clearly establishes not only

Figure 4. Buff-collared Nightjar, *Caprimulgus ridgwayi* (1996-120), at a rehabilitation center in Thousand Oaks, Ventura Co., 15 June 1996. The bird was found in Oxnard, Ventura Co., 8 June 1996 and given to the rehabilitation center, where it lost its tail. The bird died 6 July 1996; the specimen, complete with tail feathers, is retained in the Natural History Museum of Los Angeles County (LACM 109297) and represents the first record for California.

Photo by Don DesJardin

the age but also the plumage, alternate or basic, for all of these notoriously difficult-to-identify stints.

LITTLE STINT *Calidris minuta*. An adult alternate-plumaged "peep" at Bolinas Lagoon, MRN, 30 Aug 1995 (1995-109) was felt by most Committee members to be either a Little or Red-necked Stint, but none was willing to commit to a more specific identity.

WHITE-RUMPED SANDPIPER *Calidris fuscicollis*. The documentation for a basic-plumaged adult reported at Point Mugu, VEN, 24 Aug 1996 (1997-014) was felt to be inadequate to document such a rarity.

CURLEW SANDPIPER *Calidris ferruginea*. A basic-plumaged *Calidris* reported on Upper Newport Bay, ORA, 2 Jan 1995 (1995-041) may have been a Curlew Sandpiper. However, the unprecedented date (mid-winter), along with the fact that others trying to relocate this bird found a Stilt Sandpiper (*C. himantopus*) at the location, left the record with only three Committee members endorsing it on the third round.

SANDWICH TERN *Sterna sandvicensis*. A medium-sized tern with Elegant Terns at the Pajaro R. mouth, MTY, 4–11 Jul 1995 (1995-084) closely matched this species. The bill was black with a yellow tip but, unlike any known Sandwich Tern, also had red along the basal two-thirds of the tomia. One observer sent his notes and photographs (notes and photographs not returned, and presumed lost) to the late Claudia P. Wilds, and her response, attached to the record, concluded the bird was a two-year-old hybrid Sandwich × Elegant Tern. The Committee always agreed that this tern was either a Sandwich or, more likely, a hybrid, and, after three rounds of review, all but one member agreed it was most likely the latter, the single dissenter still supporting the identification as a Sandwich Tern.

Figure 5. Eastern Wood-Pewee, *Contopus virens* (1996-155), Huntington Beach, Orange Co., 1 November 1996. The solidly yellow-orange madible, realtively pale breast, and plain undertail coverts are all typical of this species, but vocalizations confirmed the identification.

Photo by Larry Sansone

Single Sandwich Terns have been found with nesting Elegant Terns in San Diego and Orange counties since 1980 (Schaffner 1981) and hybridized with an Elegant Tern in Orange County in 1995 (Collins 1997). We do not know the bill color of adult first-generation hybrid Sandwich × Elegant Terns but can arrive at a probable conclusion from information on similar-aged Sandwich × Lesser Crested Terns (*S. bengalensis*) in Europe. Lesser Cresteds appear similar to Elegant Terns and, like Elegant Terns, have orange bills. Sandwich Terns have been documented successfully hybridizing with Lesser Crested Terns in England and France (Steele and McGuigan 1989, Jiguet 1997, Dies and Dies 1998). Two different adult presumed first-generation hybrid Sandwich × Lesser Crested Terns in England were described as identical to adult Sandwich Terns, with the bill mainly black. One had a prominent yellow line along the upper third of the lower mandible, the yellow tip more extensive, and small areas of yellow around the nostril and gape (Gillon and Stringer 1994); the other had a crescent of yellow on the middle half of its maxilla (Baxter 1996). The yellow on the bill of these two presumed first-generation hybrids appears to match the red on the bill of the presumed hybrid Sandwich × Elegant Tern in Monterey County closely.

THICK-BILLED MURRE *Uria lomvia*. A dead murre photographed on a beach at Limantour Spit, MRN, "2-11-94" (2 Nov or 11 Feb?—we encourage contributors not to use this date format) (1996-031) as part of the Gulf of the Farallones National Marine Sanctuary Beachwatch Program was believed by all Committee members to

Figure 6. Yellow-bellied Flycatcher, *Empidonax flaviventris* (1996-124), banded and released at San Nicolas Island, 28 September 1996, the first for Ventura Co. Note the lack of emargination on primary 6, distinguishing this species from the Western Flycatcher (*E. difficilis sensu lato*), which normally has an emarginated sixth primary.

Photo by Walter Wehtje

be a Common (*U. aalge*) rather than a Thick-billed as originally identified from the photograph.

PARAKEET AUKLET *Aethia psittacula*. A dead auklet photographed on a beach at Limantour Spit, MRN, "3-12-95" (3 Dec or 12 Mar ?) (1996-085) as part of the Gulf of the Farallones National Marine Sanctuary Beachwatch Program was clearly a Cassin's (*Ptychoramphus aleuticus*) rather than a Parakeet as originally identified.

RUDDY GROUND-DOVE *Columbina talpacoti*. A small dove at Furnace Creek Ranch, Death Valley, INY, 30 Nov 1995 (1995-124) may have been this species, but the documentation was insufficient to persuade more than four members to support the record.

GREATER PEWEE *Contopus pertinax*. One at the San Diego Zoo, SD, 19 Sep–7 Nov 1993 (1994-061) went three rounds and was not accepted by a vote of 7–3, lacking sufficient detail to convince a few Committee members.

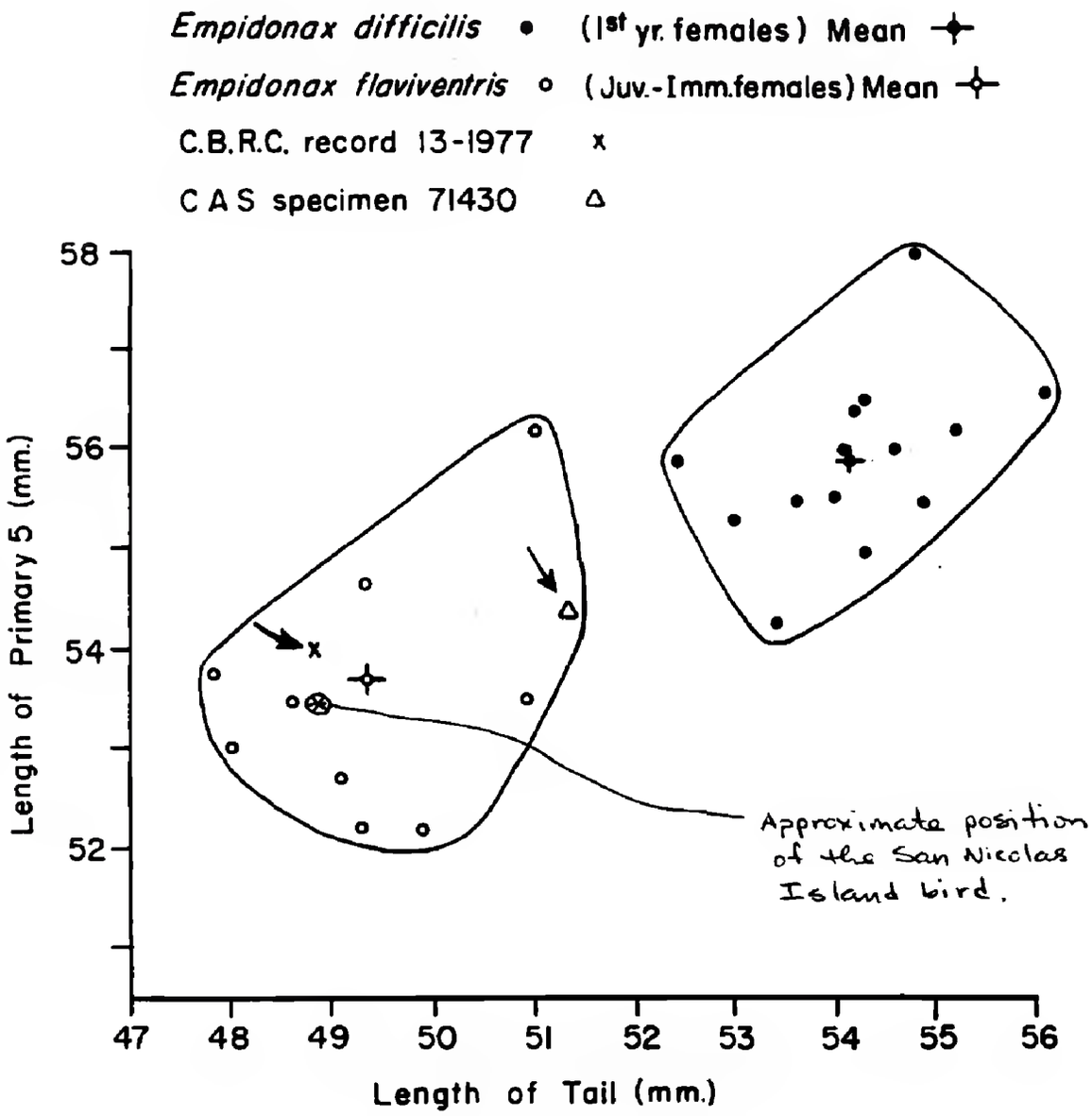

Figure 7. Scatter plot of values of length of primary 5 versus length of tail in samples of young female Western (*Empidonax difficilis sensu lato*) and Yellow-bellied Flycatchers (*E. flaviventris*). Figure adapted from DeSante et al. (1985). Additional datum added by Michael A. Patten.

DUSKY-CAPPED FLYCATCHER *Myiarchus tuberculifer*. One reported at Sepulveda Basin, Encino, LA, 1 Oct 1996 (1996-049) was silent and was about a month earlier than usual, causing concern among several Committee members.

SULPHUR-BELLIED FLYCATCHER *Myiodynastes luteiventris*. One was reported at the Twentynine Palms Marine Corps Base golf course, SBE, 26 Sep 1995 (1996-050). The brief description was insufficient to address width of the malar stripe, bill color and size, amount of white in the chin, and other marks required to separate the Sulphur-bellied from other species such as the Streaked (*M. maculatus*), Piratic (*Legatus leucophaius*), and Variegated (*Empidonomus variegatus*) Flycatchers, which may range great distances during post-breeding dispersal and have turned up in North America. Had this record been accepted it would have been the first for an inland location in California. Another reported at Point Reyes, MRN, 1 Oct 1996 (1997-055) was not accepted because the report lacked sufficient detail. Likewise, some on the Committee thought the Streaked and Variegated Flycatchers had not been ruled out.

Figure 8. This Blue Jay, *Cyanocitta cristata* (1995-080), came to a feeder at Sea Ranch, Sonoma Co., in February 1992.

Photo by Bill van Schaick

Figure 9. Arctic Warbler, *Phylloscopus borealis* (1996-158), Pismo State Beach, Oceano, San Luis Obispo Co., 28 Sep 1996, the second for California. Note the long bold supercilium coming to a sharp point at the back of the head.

Photo by Brad Schram

*SCISSOR-TAILED FLYCATCHER *Tyrannus forficatus*. One reported as a "flyover" at Vidal Wash, SBE, 24 Jun 1995 (1995-067) was seen for only a few seconds. The identification was based solely on size and shape, and the observer was unable to provide sufficient detail for the Committee to accept, even though this is a relatively straightforward identification.

ROSE-THROATED BECARD *Pachyramphus aglaiae*. One reported in Ventura, VEN, 31 Mar 1996 (1996-121) was inadequately documented. There are no accepted records for California.

SEDGE WREN *Cistothorus platensis*. One was reported from the Hayward Regional Shoreline, ALA, 16–17 Oct 1994 (1994-188). While most of the Committee thought the bird described was a Sedge Wren, the record lacked support because of inconsistencies with known field marks and an apparent lack of confidence from the observer about his sighting.

VEERY *Catharus fuscescens*. One reported near Moss Landing, MTY, 19 May 1995 (1995-068) generated much discussion about the fine points and pitfalls in identifying this species, difficult to separate from Swainson's and other *Catharus* thrushes. Most Committee members thought the description of the eyering and face were inconsistent with a typical Veery. The date was considered early by several members. Observers are cautioned to be especially careful when identifying rarities of this genus.

RUFOUS-BACKED ROBIN *Turdus rufopalliatus*. One reported at the headquarters of the Salton Sea N. W. R., IMP, 21 Oct 1995 (1996-064) was considered by most on the Committee to be inadequately described. Additional concern was raised by the date, two weeks earlier than the earliest accepted date for this species in California.

YELLOW WAGTAIL *Motacilla flava*. A single bird reported from Hayward Regional Shoreline, ALA, 6 Oct 1993 (1995-010) was not accepted on the second round of voting. Many of the field marks seemed correct but not diagnostic. Yellow Wagtails are normally quite vocal, and most on the Committee felt that during the 22 minutes the bird was observed it should have vocalized; the call would have clinched the identification. The 6 Oct date is about two weeks later than the previously established late date for this species in California.

SPRAGUE'S PIPIT *Anthus spragueii*. One reported from the Carrizo Plains, SLO, 9 Jan 1996 (1996-25) was believed by some to be correctly identified, but the vocalizations, time of the year, and behavior raised caution among many on the Committee. The description of another bird seen aboard a research vessel southeast of San Clemente Is., LA, 10 Oct 1995 (1996-051) did not rule out other pipit species such as the Red-throated (*A. cervinus*) and even American (*A. rubescens*) and was not accepted.

GRACE'S WARBLER *Dendroica graciae*. One on the Oxnard Plain, VEN, 23 Sep 1995 (1996-054) was thought by most members to be a Grace's but was not sufficiently documented to secure enough support. Over a dozen people saw the bird but only the initial observer sent documentation to the Committee. Reports from others could have provided the additional details required for acceptance. If additional details are submitted the record could be re-evaluated.

PINE WARBLER *Dendroica pinus*. One was reported on the Oxnard Plain, VEN, 7 Oct 1995 (1996-055). Many details in the description, including the short tail, are incorrect for the Pine Warbler, and many on the Committee did not think that the Prairie Warbler (*D. discolor*) had been eliminated. Pine Warblers tend to be late fall vagrants, some remaining through the winter, so the rather early date was cause for concern.

CERULEAN WARBLER *Dendroica cerulea*. One reported at Iron Mountain, SBE, 21 Apr 1996 (1996-088) received no support because it was insufficiently documented. The April date was unprecedented, being nearly four weeks earlier than the previously established early date for this species in California. While rarities can occur at almost any time, they tend to appear during well-defined windows during the year. An understanding of the spatial and temporal distribution of vagrants is a factor important in claims of their occurrence.

WORM-EATING WARBLER *Helmitheros vermivorus*. One reported from the Santa Clara River estuary, VEN, 21 Oct 1983 (1994-068) lacked sufficient detail and accuracy about plumage color. Some thought the Orange Bishop (*Euplectes franciscanus*), which has a similarly striped head, was not eliminated. Some introduced species can cause a great deal of confusion with similarly appearing North American birds, and knowledge about the ever-expanding variety and populations of non-native birds is critical to identifying vagrants (Garrett 1998).

PAINTED BUNTING *Passerina ciris*. One immature male reported near Cabrillo Beach, LA, 14 Oct 1995 (1996-058) was not accepted because the description was inadequate.

COMMON GRACKLE *Quiscalus quiscula*. A male photographed at Furnace Creek Ranch, Death Valley, INY, 28 May 1996 (1996-089) was considered by most on the Committee to be a Brewer's Blackbird (*Euphagus cyanocephalus*). Another at Capitola, SCZ, 24–26 Jan 1994 (1994-069) was not accepted because several members felt confusion with the Great-tailed Grackle (*Q. mexicanus*) was possible.

COMMON REDPOLL *Carduelis flammea*. Up to three, with one roughly sketched, were reported from Mountain Home Village, SBE, 13 Jan 1996 (1996-071). The documentation was unacceptable for such an unprecedented record. The only accepted records in California are from the extreme north and northeast.

RECORDS NOT ACCEPTED, Identification accepted but natural occurrence questionable

GRAY SILKY-FLYCATCHER *Ptilogonys cinereus*. One at Point Loma, SD, 24 May 1993 (NW, REW; 1993-115) had a worn tail and other abnormalities associated with a caged bird. This is the third record submitted to the Committee, and because of questionable natural occurrence none has been accepted. Several Committee members suggested that a pattern of occurrence in Arizona, where no accepted record exists, should emerge before this species is accepted as naturally occurring in California. One CBRC member suggested that this species is a candidate for occurrence in California because it occurs quite far north in Mexico. Furthermore, it may be noteworthy that all of the reports for California have been in the spring at a time when large flocks of the berry-eating Cedar Waxwing (*Bombycilla cedrorum*) are on the move in California.

PAINTED BUNTING *Passerina ciris*. An adult male coming to a backyard feeder in Chula Vista, SD, 11–13 Jan 1993 died and was salvaged (#SDNHM 48279; 1997-189). Another was at Atascadero Creek, Goleta, SBA, on 10 Sep 1995 (RH; 1996-059). Both were correctly identified, but their origins were considered suspect. Everyone on the Committee agreed that a male Painted Bunting found in Indian Wells Valley, KER, 1 Jul 1996 (TMi; 1996-092) was also correctly identified. The July occurrence, outside the normal vagrancy window for this species, troubled most

members, and this record was not accepted because of questionable natural occurrence. Painted Buntings are frequently seen in cages throughout Baja California and may be the source of many of the Painted Buntings found in southern California.

RECORDS NOT ACCEPTED, Identification accepted but establishment of introduced population questionable

TRUMPETER SWAN *Cygnus buccinator.* The Committee has struggled with this species in more ways than one. In addition to identification problems, the highly managed nature of many populations in the lower 48 states (especially eastern Washington and eastern Oregon; Feltner et al. 1989, Gilligan et al. 1994) presents a unique situation. The Committee has discussed this issue repeatedly but at its annual meeting in January 1999 agreed that records from "managed" populations outside of the historic range of the species and not known to be established are to be "not accepted, establishment of introduced population questionable." Records will not be circulated if, on the basis of a neckband, the bird in question is known to come from such a population. We believe this preferable to considering these records indicative of the normal movements of birds from native or well-established populations or considering them "not accepted, natural occurrence questionable." The fate of the following five records was determined at the 1999 CBRC meeting.

Two at Lower Klamath N. W. R., SIS, 2 Feb 1987 (MFR; 1987-153) were previously accepted but never published. One bird had been marked as a cygnet in 1981 at Turnbull N. W. R., Washington, and had been observed with Tundra Swans (*C. columbianus*) north of Vancouver, British Columbia, in "winter 1985." The second bird was perhaps guilty by association. Another previously accepted but unpublished record involved a female at Lake Almanor, PLU, 1 Jan–15 Feb 1988 (TMa; HG, BEDe; 1988-204). It had been collared at Malheur N. W. R. on 26 Aug 1986 (Littlefield 1990). One other record (two at Modoc N. W. R., MOD, 30 Nov–26 Dec 1993; 1994-004) was published as "not accepted, natural occurrence questionable" by Garrett and Singer (1998). Two final records of birds captured and marked at Red Rocks Lake N. W. R., Idaho, and released at Summer Lake, Oregon, had never reached a final decision before January 1999: one was at Tecopa, INY, 23 Jan 1992 (JTa, BSt†; 1992-206); three immatures were in the Owens Valley, INY, 24 Dec 1992–5 Apr 1993 (JH†, TH; 1993-065).

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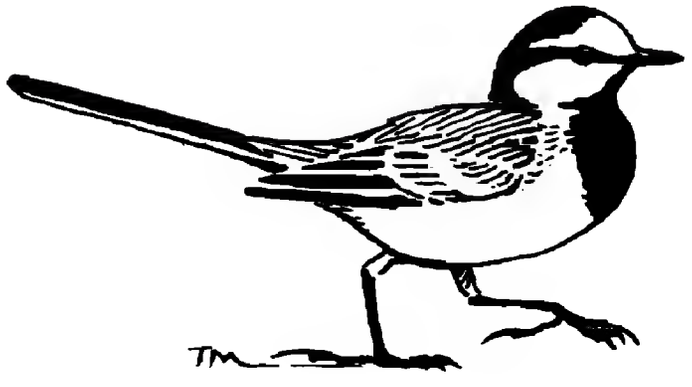

IDENTIFICATION OF ADULT MALE RUFOUS AND ALLEN'S HUMMINGBIRDS, WITH SPECIFIC COMMENTS ON DORSAL COLORATION

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Our understanding of the status of vagrant hummingbirds across eastern North America has changed dramatically over the past three decades (Conway and Drennan 1979; see fall and winter seasonal reports in *American Birds/Field Notes*). Although an increase in hummingbird feeders and observers' expertise undoubtedly has contributed to our knowledge of extralimital hummingbirds, Hill et al. (1998) hypothesized that the significant increase in transient and wintering Rufous Hummingbirds (*Selasphorus rufus*) in the East is primarily a result of a relatively recent change in this hummingbird's innate migratory behavior. Regardless of the reason(s), not all *Selasphorus* hummingbirds in the eastern United States have been Rufous; banding and in-hand measurements have documented Allen's (*S. sasin*) in several states east of the Rockies (Newfield 1983, Andrews and Baltosser 1989, Stedman 1992, Grzybowski 1993, Jackson 1993, Davis 1994, Texas Ornithological Society 1995). There are now more than 15 records for this species in both Mississippi and Alabama (R. Sargent pers. comm.).

The conventional field characters for distinguishing adult males of the Rufous and Allen's hummingbirds have been dorsal coloration and aggression displays: the Rufous has a rufous back and an oval display flight, whereas Allen's has an all-green back and an "arching pendulum-like (= J-shaped)" courtship display (Pough 1957, Johnsgard 1983, National Geographic Society 1983, Peterson 1990). These authors, however, apparently overlooked cautionary statements in the literature about the dorsal coloration of adult males. An exhaustive compilation of molt, age, and identification criteria for hummingbirds does not mention the possibility of mostly or wholly green-backed adult male Rufous Hummingbirds (Pyle 1997). Loye Miller (in Willett 1933) was the first to state that some adult male Rufous Hummingbirds have entirely green backs. Phillips et al. (1964) reiterated this same point, and Phillips (1975) specifically mentioned a wholly green-backed adult male specimen that he identified as a Rufous Hummingbird. More recently, Kaufman (1990) underscored that dorsal coloration of adult males is not diagnostic, and he advanced the notion that Allen's is not identifiable under field conditions away from its breeding grounds. Because none of these papers presented supportive data, coupled with many authors' apparent oversight of this literature, the merit of back coloration as a diagnostic field character remains controversial. Therefore, some ornithologists and state bird records committees have been reluctant to accept field identifications of adult males of these two species without additional measurements obtained in the hand (see Langridge 1988, Lasley and Sexton 1991, Lasley and Sexton 1992). In this

paper we address variation in the back color of adult male Rufous and Allen's hummingbirds and its bearing on field identification.

METHODS

We examined 202 specimens of adult male Rufous and Allen's hummingbirds from 14 museums and universities (see Acknowledgments for list of institutions). All specimens had complete gorgets with the lateral feathers elongated (Pyle 1997, fig. 99H) and lacked bill corrugations (Ortiz-Crespo 1972, Yanega et al. 1997). Therefore we presumed them to be in at least their second calendar year (Pyle 1997). Robbins measured wing chord (unflattened), tail length (central rectrices), exposed culmen, and width of the fifth (outermost) rectrices with calipers to the nearest 0.1 mm. Although we measured the width of rectrix 1 (central), we consider this character to be too variable, because it varies considerably as the result of how the specimen was prepared. We excluded specimens lent by the Museum of Vertebrate Zoology, University of California (15 specimens of each species), from our morphological analysis so that our sample would be independent of Stiles' (1972).

Our examination of 153 adult male specimens of the Rufous Hummingbird clearly demonstrated a continuum in dorsal coloration from individuals with almost entirely rufous backs (most have a few green feathers) to those with entirely green backs (Figure 1). To minimize the inclusion of potential hybrids, we analyzed specimens with <50% and >50% of the back green separately, using only those with <50% of the back green to characterize the measurements of the adult male Rufous. We characterized adult male Allen's with specimens of the nominate subspecies only; all of these specimens had entirely green backs. We excluded subspecies *sedentarius* because our sample of it was small; however, as Stiles (1972) noted and our inspection of nine specimens also indicated, the only difference between the two subspecies is culmen length.

RESULTS

Our measurements of the 125 adult male Rufous with <50% of the back green and 28 Allen's are very similar to Stiles' (1972) (Table 1). As mentioned above, Stiles' sample (30 individuals/species) was independent of ours. In addition to the significant difference in the width of rectrix 5 (outermost) (Table 1; t test = 16.14, df = 148, $P < 0.025$), we found that adult male Rufous have longer wings (t test = 13.78, df = 150, $P < 0.025$) and tails (t test = 16.08, df = 149, $P < 0.025$) than adult male Allen's. In our samples, the two species' exposed culmen lengths did not differ statistically (t test = 1.19, df = 137, $P > 0.05$). In none of the 125 Rufous specimens with <50% of the back green did measurements suggest hybridiżation. Furthermore, all males in this group had the "deep emargination" at the tip of rectrix 2 characteristic of adult male Rufous (Stiles 1972; Figure 2). All 28 specimens used for defining the measurements of Allen's had a non-emarginated tip on rectrix 2.

Of the 16 Rufous with >50% of the back green, only three have characters suggesting they may be hybrids (Table 2). Ironically, the specimen

Figure 1. Variation in dorsal coloration of adult male Rufous Hummingbirds from all green to all rufous. Specimens (from left to right): UAM 5664, CMNH 115470, MVZ 5411, UW 38697, and LSUMZ 40256.

that Phillips (1975) reported as an adult male Rufous with an all-green back is likely a hybrid. Although he did not cite the number of the specimen taken at San Francisco Peaks, north of Flagstaff, Arizona, on 26 July 1969, it is obvious that Northern Arizona University 708 is the specimen. This specimen's wing length, 40.5 mm, and width of the fifth rectrix, 2.6 mm, fall within the variation for Rufous, whereas the tail length, 23.5 mm, is short even for adult male Allen's (Table 1); however, the very tip of the tail is somewhat worn. Unfortunately, several millimeters of the tips of both second rectrices are missing, apparently destroyed when the bird was collected, precluding assessment of this important character.

We found two other likely hybrids. One, collected on 28 February 1937 at Yuma, Arizona (San Diego Natural History Museum [SDNHM] 17485), has an all-green back and the wing length (38.7 mm) of Allen's. Its tail length (26.6 mm), however, is intermediate. Furthermore, the shape of the tip of the right rectrix 2 (the left is missing) is also intermediate—it is slightly emarginated. A second bird (Louisiana State University Museum of Natural Science [LSUMZ] 89623), taken on 6 January 1979 at Metairie, Jefferson Parish, Louisiana, was initially identified as a hybrid Rufous × Allen's (Hamilton 1979), but A. R. Phillips later annotated the specimen as an Allen's with the tip of rectrix 2 anomalously emarginated. We suspect that LSUMZ 89623 is a hybrid because its rectrix 2 is even more emarginated than that of SDNHM 17485. The wing chord (38.0) falls within the variation of Allen's; however, the wings are badly worn. But the tail is in good condition and is intermediate (25.7) in length (Table 1).

Table 1 Measurements (mm) of Adult Male Rufous[a] and Allen's[b] Hummingbirds

	This study			Stiles (1972)		
	n	Mean	SD[c]	*n*	Mean	SD
Wing length (chord)						
Rufous	124	40.62	0.87	30	40.32	0.87
Allen's	28	38.11	0.89	30	38.08	0.84
Tail length						
Rufous	123	27.90	0.90	30	27.36	0.91
Allen's	28	24.96	0.74	30	24.37	0.74
Width of rectrix 5 (outer)						
Rufous	123	2.64	0.29	—	—	—
Allen's	28	1.70	0.20	—	—	—

[a]Specimens with <50% of the back green only.

[b]Subspecies *Selasphorus sasin sasin* only.

[c]Standard deviation.

Figure 2. Tails of adult male Allen's (right) and Rufous (left) hummingbirds. Compare the width of the fifth rectrices (outer): narrow in Allen's versus relatively broad in the Rufous. Also note the difference in the shape of the tip of rectrix 2: nonemarginated in Allen's versus notched or emarginated in the Rufous.

Finally, although our sample sizes from the breeding range are small, we found no geographical component to the amount of green on the back of adult male Rufous Hummingbirds. Breeding birds near the zone of contact with Allen's in southwestern Oregon and northwestern California show no increase in green on the back.

DISCUSSION

Our results reveal considerable variation in back color, from all rufous to entirely green, in adult male Rufous Hummingbirds (Figure 1). In our sample of 153 presumed pure Rufous Hummingbirds, seven (5%) have the back at least 75% green, and two have the back 95–100% green (Table 2). Thus Miller (in Willett 1933), Phillips et al. (1964), and Kaufman (1990) were correct in stating that entirely green-backed adult males of the Rufous/Allen's complex cannot be reliably identified under field conditions. If an adult male has some rufous in the back, however, it is a Rufous or perhaps a hybrid, because adult male Allen's invariably have all-green backs. Some Allen's have a few back feathers that are rufous-fringed, but these are only visible when the bird is in the hand. Nonetheless, Pyle (1997) reported that some adult male Allen's Hummingbirds have up to 40% of the back rufous. Pyle's information was based on accounts by Patterson (1988, 1990; Pyle pers. comm.). Patterson's reports, however, failed to consider hybridization as a possible explanation for the anomalous characters of both an adult male and female *Selasphorus* that he banded and identified as Allen's from the northern coast of Oregon. In fact, the presence of rufous on the lower back, the intermediate width (2.2 mm) of rectrix 5, and the slight emargination of rectrix 2 of the Oregon adult male closely fit the specimens that we have identified as possible hybrids. Unfortunately, neither Oregon bird was collected nor were diagnostic tail feathers saved. Specimen confirmation will be required to establish that adult male Allen's have anything other than all-green backs.

Studies in the region of potential overlap in southwestern Oregon and northwestern California are needed to ascertain to what extent hybridization may occur. Another means in which hybridization might occur is on the wintering grounds or during migration, when these two species are broadly sympatric (AOU 1998). Males of both Rufous and Allen's hummingbirds frequently display during migration and on the wintering grounds (McKenzie pers. obs.). Quay (1989) demonstrated in passerines that insemination can occur prior to arrival on the breeding grounds; nevertheless, it is not known if fertilization and eventual offspring result from such inseminations and if this phenomenon is possible with hummingbirds.

We offer the following recommendations for identifying extralimital Rufous/Allen's hummingbirds of all age classes: (1) Field identification of adult male Allen's and some adult male Rufous cannot be made unless the diagnostic courtship flight is observed; nonetheless, both courtship and aggression displays, which superficially can appear similar, have been noted during migration and on the wintering grounds. Consequently, caution should be exercised in using displays for distinguishing these species away from the breeding grounds (R. Sargent pers. comm.). (2) Licensed banders should capture the bird and carefully measure its wing and tail length; the

Table 2 Measurements (mm) of Rufous Hummingbirds with > 50% of Back Green and Possible Hybrids

Specimen[a]	Wing length (chord)	Tail length	Width of rectrix 5	Rectrix 2 emarginated	Fraction of back green[b]
CMNH 115470	41.6	27.6	2.8	yes	2
MCZ 304927	40.7	—	2.7	yes	1
CMNH 162244	39.5	28.8	2.7	yes	1
WFVZ 6592	39.9	27.5	2.8	yes	2
UW 31256	40.4	27.3	2.7	yes	1
UW 37221	40.7	27.8	2.9	yes	1
UW 53596	39.6	27.3	3.0	yes	2
AMNH 49363	39.7	28.2	2.6	yes	1
UAM 5664	42.1	28.3	3.0	yes	3
UA 962	42.0	27.8	2.8	yes	2
FMNH 138817	39.0	28.5	2.7	yes	3
FMNH 138816	41.7	28.5	2.7	yes	1
SDNHM 46886	40.3	27.7	2.8	yes	2
SDNHM 17485[c]	38.7	26.6	1.9	slightly	3
NAU 708[c]	40.5	23.5	2.6	?	3
LSUMZ 89623[c]	38.0	25.7	1.9	yes	3

[a]See Acknowledgments for initials of institutions.

[b]1, 50–74%; 2, 75–94%; 3, 95–100%.

[c]Possible hybrid.

first, second, and fifth rectrix from one side of the bird's tail should be removed and preserved; these feathers will grow back. Permits issued by the U.S. Fish and Wildlife Service should explicitly state that removal of diagnostic feathers is approved. (3) Pulled rectrices and measurements should be forwarded to relevant state/provincial bird records committees, and ultimately these feathers should be deposited in an appropriate museum. (4) Individuals with measurements that do not fully agree with those of one species could be hybrids and should be listed as Rufous/Allen's. (5) Care should be taken to eliminate other species, especially the Broad-tailed (*Selasphorus platycercus*) and Calliope (*Stellula calliope*), because adult females and immatures of these two are very similar to females and immatures of the Rufous/Allen's complex (see Kaufman 1990 for an excellent discussion on how to distinguish these species).

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Figure 3. Similarity in dorsal coloration among two adult male Allen's Hummingbirds (outer birds, MCZ 33022 at left, and LSUMZ 13183 at right) and a mostly green-backed adult male Rufous Hummingbird (middle, FMNH 138817).

University, Cambridge, Massachusetts), Ned Johnson and Carla Cicero (Museum of Vertebrate Zoology, University of California, Berkeley), Gary Graves (National Museum of Natural History, Smithsonian Institution), Scott Moody (Ohio University, Athens), Philip Unitt (San Diego Natural History Museum), Daniel Gibson (University of Alaska Museum [UAM], Fairbanks), William Baltosser (University of Arkansas [UA], Little Rock), Russell Balda (University of Northern Arizona [NAU], Flagstaff), and Sam Sumida (Western Foundation of Vertebrate Zoology [WFVZ], Camarillo, California). We are indebted to Peter Pyle for providing information on adult male *Selasphorus* hummingbirds in Oregon. William Baltosser, Kimball Garrett, J.V. Remsen, Robert Sargent, and Philip Unitt provided valuable comments on the manuscript.

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ARIZONA BIRD COMMITTEE REPORT, 1974–1996: PART 2 (PASSERINES)

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This report covers the passerines during the period from 1974 through 1996 (part 1, the nonpasserines, has been published separately; see W. Birds 29:199–224). Two previous reports by the Arizona Bird Committee (ABC) have been published (Speich and Parker 1973; Speich and Witzeman 1975). The ABC sincerely regrets not publishing reports on a timely basis and hopes to do better in that regard in the future. Since 1974, no fewer than 46 species have been added to the Arizona list, 26 of which are included in the passerine portion of the report. The following species were accepted as first state records: Great Kiskadee, Cave Swallow, Blue Jay, Northern Wheatear, Aztec Thrush, Blue Mockingbird, wagtail sp., Red-throated Pipit, Blue-headed Vireo (recently split from the Solitary Vireo), Tropical Parula, Crescent-chested Warbler, Pine Warbler, Prairie Warbler (first documentation), Cerulean Warbler, Swainson's Warbler, Connecticut Warbler, Mourning Warbler, Canada Warbler, Slate-throated Redstart, Rufous-capped Warbler, Flame-colored Tanager, Field Sparrow, Leconte's Sparrow, Snow Bunting, Common Grackle, and Black-vented Oriole. Most of these reports have been previously published as sightings in *American Birds* or *National Audubon Society Field Notes* (Am. Birds/NASFN hereafter), but this is the first time the ABC has reviewed and endorsed these records. More than 1000 reports have been reviewed by the ABC since 1974; original reports and photos are housed in a file in the ornithology collection at the University of Arizona in Tucson. As is likely for most records committees, numerous records of many species have not been submitted to or reviewed by the ABC but have been published in Am. Birds/NASFN. A summary of records outstanding follows each. It is the hope and intent of the ABC to solicit documentation for as many of these as possible. Most records prior to 1972, as published in previous scholarly ornithological works (Phillips et al. 1964; Monson and Phillips 1981), have not been evaluated by the ABC. We have noted when a species has been removed from our review list (as indicated by an asterisk in the ABC's Field Checklist of the Birds of Arizona; Rosenberg and Stejskal 1994), and we have noted when sketch details are still requested for inclusion of records in *Field Notes* (noted by a diamond in the Checklist). The importance of documenting rarities was discussed by Howell and Pyle (1997) and Rosenberg and Witzeman (1998).

Each record listed below includes a locality, county (abbreviation: see below), date (span normally as published in Am. Birds/NASFN), and initial observer if known. Additional observers who submitted reports and photographs are also listed. All records are sight records unless noted otherwise with a symbol for a photograph, sound recording, or specimen. It has not been customary for the ABC to review individuals returning for multiple years, but these dates are normally included within the accounts.

The ABC's abbreviations for counties in Arizona are as follows: APA, Apache; COS, Cochise; COC, Coconino; GIL, Gila; GRA, Graham; GRE, Greenlee; LAP, La Paz; MAR, Maricopa; MOH, Mohave; NAV, Navajo; PIM, Pima; PIN, Pinal; SCR, Santa Cruz; YAV, Yavapai; YUM, Yuma. Other nonstandard abbreviations commonly used within this report include *, specimen; B.T.A., Boyce Thompson Arboretum; F.M.I.R., Fort McDowell Indian Reservation; L.C.R., Little Colorado River; L.C.R.V., Lower Colorado River Valley; N.I.R., Navajo Indian Reservation; N.M., national monument; N.W.R, national wildlife refuge; ph., photograph; P.A.P., Pinal Air Park; P.R.D., Painted Rock Dam; S.P.R., San Pedro River; s.r., sound recording; UA, University of Arizona.

RECORDS ACCEPTED

NORTHERN BEARDLESS-TYRANNULET *Camptostoma imberbe*. One extralimital record from along the Verde R., F.M.I.R., MAR, 1 Jun 1975 (ST) represents the northwesternmost record for Arizona.

GREATER PEWEE *Contopus pertinax*. Two extralimital records reviewed by the ABC include one from w. Phoenix, MAR, 7 Dec 1974–7 Jan 1975 (JFi) and one from Cibola, L.C.R.V., LAP, 15 Dec 1977 (PMa). This species has been found recently during the breeding season as far north and west as the Hualapai Mountains.

EASTERN WOOD-PEWEE *Contopus virens*. One accepted report of a singing male along the L.C.R. w. of Eagar, APA, 10 June 1990 (PL, SFi). One specimen from Tucson, PIM, 7 Oct 1953, and three additional sight records were listed by Monson and Phillips (1981).

YELLOW-BELLIED FLYCATCHER *Empidonax flaviventris*. One wintering individual was well documented at Patagonia, SCR, 20 Dec 1992 through Feb 1993 (WR; ph. GR; s.r. DSj). This represents the only Arizona record other than a specimen taken in Tucson, PIM, 22 Sep 1956 (Monson and Phillips 1981).

ACADIAN FLYCATCHER *Empidonax virescens*. The only Arizona record is of a specimen collected at Tucson, PIM, 24 May 1886 (H. Brown; Monson and Phillips 1981); the ABC agrees that the specimen is indeed an Acadian.

BUFF-BREASTED FLYCATCHER *Empidonax fulvifrons*. One extralimital report of one along Arivaca Creek, PIM, 29 Mar 1996 (AFl). This represents one of only a few reports of a migrant away from nesting habitat and the westernmost record for the state.

EASTERN PHOEBE *Sayornis phoebe*. Early records reviewed included one in Tempe, MAR, 24 Oct 1975 (ST), one at St. David, COS, 24 Jan 1976 (DD), one at Phoenix, MAR, 23 Nov–26 Dec 1977 (DSj), and another in s.w. Phoenix, MAR, 25 Nov 1977–20 Feb 1978 (DSj). Since 1975 there have been more than 100 records from Arizona; sketch details are still requested for reports' inclusion in *Field Notes*.

DUSKY-CAPPED FLYCATCHER *Myiarchus tuberculifer*. One extralimital record reviewed by the committee from the Superstition Wilderness Area, MAR, 30 May 1976 (RNt) established, at the time, the northernmost record for the state. Since then there have been a few records of birds farther north (Mogollon Rim), but these have not been reviewed by the ABC.

GREAT KISKADEE *Pitangus sulphuratus*. Two records have been accepted by the ABC. One along Sabino Creek below Sabino Canyon, PIM, 15–29 Mar 1978 (MSh) established the first state record, and another at Canoa Ranch, PIM, 27 Dec

1979–27 Feb 1980 (ph. ST) was the first record for Arizona documented with a photograph.

TROPICAL KINGBIRD *Tyrannus melancholicus*. Two extralimital records away from known breeding areas in southern Arizona were reviewed and accepted, one at Granite Reef Picnic Area, MAR, 30 May 1975 (ST), and one at Keams Canyon, NAV, 20 May 1996 (ph. RJo), establishing the first record from northern Arizona.

EASTERN KINGBIRD *Tyrannus tyrannus*. Early records evaluated by the committee included one at St. Johns, APA, 23 Jun 1974 (ST) and one from Nutrioso L., APA, 23 Jun 1975 (RCl). This species is most likely a rare annual migrant, with more than 50 reports since 1975; sketch details are still requested for inclusion of reports in *Field Notes*.

SCISSOR-TAILED FLYCATCHER *Tyrannus forficatus*. One s. of Gila Bend, MAR, 22 May 1974 (TSj), one at Avondale, MAR, 23 May 1975 (SD), one at Continental, PIM, 9 June 1975 (EWh), one at Tombstone, COS, 24 Sep–5 Oct 1975 (DD), one at Portal, COS, 12 May 1977 (PJe), two there 19 May 1990 (MEm), a pair near Gila Bend, MAR, 9 Jul–28 Aug 1994 (ph. DKa), and a pair at Dudleyville, lower S.P.R., PIN, 23 Jun–8 July 1995, when a female was seen carrying nesting material. Since 1975, more than 45 reports of this species have been published in Am. Birds/NASFN; the Scissor-tailed Flycatcher is no longer a review species, but sketch details are still requested for reports' inclusion in *Field Notes*.

NORTHERN SHRIKE *Lanius excubitor*. Extralimital records away from "regular" wintering areas in northern Arizona that have been reviewed and accepted are of one at Portal, COS, 30 Dec 1976 (JWz), one at Poston, LAP, 21 Nov 1977 (TBr), one near Arlington, MAR, 10 Nov 1979 (ph. KI), one at Topock, MOH, 15 Jan 1982 (ph. GR; see Rosenberg et al. 1991:278), and one at Palominas, COS, 17 Dec 1988–16 Feb 1989 (WR, GR; ph TCo). Although this shrike is apparently an irregular winter visitor to much of northern Arizona, the ABC still requests to review all reports from southern Arizona.

WHITE-EYED VIREO *Vireo griseus*. Accepted records are of one at Phoenix, MAR, 16 Nov 1975 (DSj), one at Round Rock, APA, 10 Oct 1980 (DSz), one at Tucson, PIM, 18–25 Jul 1983 (ph. GM), one at the B.T.A., PIN, 6–22 Sep 1986 (RNt), one in Whitetail Canyon near Paradise, COS, 11 Jun 1988 (RTa), one on the upper S.P.R., COS, 3–19 May 1991 (WHo; s.r. GR), one found dead at the Phoenix Zoo, MAR, 1–7 Dec 1991 (KI; *skeleton UA), one in e. Mesa, MAR, 27 May 1992 (MMo), and one at Dudleyville, PIN, 30 Jul 1993 (TCo). Two additional sight records were listed by Monson and Phillips (1981) bringing the total state records to 11.

YELLOW-THROATED VIREO *Vireo flavifrons*. The following records have been accepted: one at Seven Springs, MAR, 15 Jun 1974 (GBa), one at Cave Creek Canyon, COS, 13 Jun 1979 (BSc), one at Bisbee, COS, 14 Sep 1981 (DD), one at Madera Canyon, SCR, 5 Aug 1983 (LTh), one at the B.T.A., PIN, 16 May 1987 (CBa), one at Portal, COS, 3 May 1989 (TBe), one at South Fork of the L.C.R., APA, 27 May 1989 (CBa), one along the upper S.P.R., COS, 7 Jul–17 Sep 1992 (JWh), presumably the same individual present there 28 May–20 Sep 1993 (JWh), and again 4 Jun 1994 (RJo). Since 1974, 11 reports have been published in Am. Birds/NASFN but not reviewed by the ABC.

BLUE-HEADED VIREO *Vireo solitarius*. Since the Blue-headed Vireo has been split as a species from the Plumbeous and Cassin's Vireos, only two Blue-headeds have been reviewed and accepted by the ABC; both were along the upper S.P.R., COS, one 26 Sept 1987 (DKr), the other 16 Nov 1987 (TCo). There remains no physical documentation of this species' occurrence in Arizona.

PHILADELPHIA VIREO *Vireo philadelphicus*. Accepted records are of one in s.w. Phoenix, MAR, 6–7 Oct 1977 (GR), one at Kayenta, NAV, 3 Sep 1978 (GR, ST), one in s.w. Phoenix, MAR, 23 Sep 1978 (RBr), one at Richville, APA, 5 Oct 1978 (GR, ST, KK), one in Bisbee, COS, 8 Sep 1980 (DD), one in Tucson, PIM, 27–28 Sep 1980 (WDa), one at Tanque Verde Ranch, Tucson, PIM, 28 Oct 1982 (ph. PWa), one at Keams Canyon, NAV, 14 Sep 1985 (BJa), one found dead in Tucson, PIM, 5 Oct 1985 (SMR; *UA), one along the upper S.P.R., COS, 27 Sep 1987 (TCo), and one at the B.T.A., PIN, 4 Oct 1987 (DSj). Five additional reports (Aug 1978, Oct 1980, Oct 1981, Sep 1982, Sep 1987) were published in Am. Birds/NASFN but have not been reviewed by the ABC.

RED-EYED VIREO *Vireo olivaceus*. Early records reviewed and accepted by the committee are of one in s.w. Phoenix, MAR, 13 Jul 1974 (ST), one in s.w. Phoenix, MAR, 6 Aug 1974 (DSj), one in Phoenix, MAR, 3 Nov 1974 (DSj), one at Patagonia, SCR, 17 Jul 1975 (RDe), one in Cave Creek Canyon, COS, 3 Jul 1976 (DSz), and one in Sabino Canyon, PIM, 4 Oct 1976 (WRo). The status of the Red-eyed Vireo has certainly changed in recent years, with most of the records coming before 1990. Between 1974 and 1996, no fewer than 60 individuals were reported statewide. Sketch details are still requested for inclusion of sightings in *Field Notes*.

YELLOW-GREEN VIREO *Vireo flavoviridis*. Accepted records are all from southern Arizona; one was in Guadalupe Canyon, COS, 11 May 1975 (RBu), one was near Patagonia, SCR, 19–27 Jun 1975 (KZn), and one was at Paloma, MAR, 13 Jul 1980 (GR; ph. RW), the latter providing the first physical documentation for the state. The Yellow-green Vireo is now considered a regular fall vagrant to coastal California (see Terrill and Terrill 1981), yet all of the Arizona records are from spring and summer. One additional record was published by Monson and Phillips (1981).

BLUE JAY *Cyanocitta cristata*. One was photographed at Wahweep, L. Powell, COC, 31 Oct–9 Nov 1976 (JMi), establishing a first Arizona record. Another was at St. David, COS, 15 Dec 1989–8 May 1990 (AGo; ph. GR; Figure 1; see Am. Birds 44:304), and one was s. of Willcox, COS, 18 Nov 1993 (EWi). Two additional sight records (May 1977, May 1988) have been published in Am. Birds/NASFN but not reviewed by the ABC.

CAVE SWALLOW *Petrochelidon fulva*. Four records have been accepted by the ABC. One found with Cliff Swallows (*P. pyrrhonota*) at the University of Arizona campus in Tucson, PIM, 11 May–7 June 1979 was reported again 11 Apr–27 May 1980 (DSz, DCo) and in 1981 and 1982. A pair nested and fledged three young at the same location 17 May–19 Jul 1983 (ph. THu), and at least one male was reported from the same area each summer through 1987 (see Huels 1984). Another Cave Swallow was found 1 mile up the Verde R. from its confluence with the Salt R., MAR, 21–31 Dec 1987 (ph. TGa), establishing the only documented winter record for the state. One was at Kino Springs, SCR, 17 Aug 1991 (SMl). One additional report (Oct 1991) was published in Am. Birds but not evaluated by the ABC.

BLACK-CAPPED CHICKADEE *Parus atricapillus*. Three records have been accepted by the committee. One was at Teec Nos Pos, APA, 26 Nov 1976–5 Feb 1977 (DSz; ph. GM), one was at Many Farms, APA, 5–19 Jan 1986 (ph. BJa), and at least six were along Short Creek at Colorado City, MOH, 1–7 Dec 1996, with one remaining until 26 Jan 1997 (TCo, CL; ph. TCo, GR, MSt; Figure 2). One additional report from Pipe Springs N.M., MOH (Nov 1978), was published in Am. Birds but has not been reviewed by the ABC. Three additional records prior to 1975 were listed by Monson and Phillips (1981).

BRIDLED TITMOUSE *Parus wollweberi*. One extralimital record has been reviewed and accepted by the ABC; one wandered n.w. to Bill Williams R., LAP, 17 Feb

Figure 1. Arizona's third Blue Jay at St. David, 15 December 1989–8 May 1990.

Photo by Gary H. Rosenberg

into Mar 1977 (JBy; *UA). It represents the northwesternmost record of the species and was within 10 miles of California, where the Bridled Titmouse is unrecorded.

BLACK-CAPPED GNATCATCHER *Polioptila nigriceps*. After first being found along Sonoita Creek near Patagonia, SCR, in 1971 (Phillips et al. 1973), one was reported and accepted from there 29 May–26 Jun 1975 (RKe). Another pair was found nesting in Chino Canyon, PIM, 17 May 1981 (ph. BBa), successfully fledging eight young from three different nests by early September. Birds were reported sporadically from Chino Canyon through the summer of 1986. After a long hiatus, another pair was reported there 28 Aug 1991 and again 7 Apr–21 July 1996 (JMa; ph. TCo). One must wonder if this species is present at this locality in small numbers every year. Another pair was located near the bottom of Sycamore Canyon, SCR, 13 Jun 1984 (ph. PCo; see Am. Birds 38:1049) and may have been present continuously there until 27 Jul 1986, when a pair with a nest and young was reported (ph. MOB; see Am. Birds 40:1239). One additional record (Jan 1987) was published in Am. Birds but has not been evaluated by the ABC.

NORTHERN WHEATEAR *Oenanthe oenanthe*. One found near the P.A.P. pecan grove near Marana. PIM, 29 Oct 1996 (ph. JLe, SLe, GM; Figure 3; see *Field Notes* 51:97) provided Arizona with its first and only record.

VEERY *Catharus fuscescens*. A singing male was located along the South Fork of the L.C.R. w. of Eagar, APA, 5 Jul 1975 (KK), at the same locality where one was collected in 1936 (Monson and Phillips 1981). For several years after 1975, the Veery was considered a very rare summer resident at that locality, but there have not been

Figure 2. Amazing were six Black-capped Chickadees along Short Creek in Colorado City, extreme northwestern Arizona, 1 December 1996–26 January 1997.

Photo by Gary H. Rosenberg

any sightings since 1987. Other accepted records away from South Fork are of one at Patagonia, SCR, 25 May 1976 (SMl) and one at the B.T.A. 4 Jul–25 Aug 1992 (TCo; ph. SGa; see Am. Birds 47:127). One additional report from the upper S.P.R. (May 1986) was published in Am. Birds but has not been reviewed by the ABC.

WOOD THRUSH *Hylocichla mustelina*. Accepted records are of one at Cave Creek Canyon, COS, 29 Oct 1966 (SMR; *UA), one at Portal, COS, 29 May 1976 (s.r. KZm), one at Sanders, APA, 6 Oct 1978 (GR, ST, KK, JWz), one at Kearny, n.e. Winkleman, PIN, 22–24 Nov 1978 (ph. FRe), one in Garden Canyon, COS, 13 Oct 1980 (JEp, BEp), one at the B.T.A., PIN, 18 Oct 1980 (GR. RDu) and again 22–28 Oct 1991 (EHa), one at Portal, COS, 12–21 May 1983 (SSp), and one at Tucson, PIM, 9 Nov 1993 (THu; *UA). Three other records since 1975 (Oct 1978, May 1987, Apr 1988) have been published in Am. Birds/NASFN but have not been evaluated by the ABC.

RUFOUS-BACKED ROBIN *Turdus rufopalliatus*. Records that have been reviewed formally by the committee are of single birds at Patagonia, SCR, 15 Dec 1974 (JMn), 12 Nov 1984 (JPr), and 26 Feb–21 Mar 1988 (MPa), one in s.w. Phoenix, MAR, 16 Feb 1975 (SHe), and one at Peña Blanca L., SCR, 28 Jan–8 Feb 1996 (MMa). Since 1974, at least 70 individuals have been reported from Arizona, and although it was apparently more prevalent in the 1970s and early 1980s than currently, it is still nearly annual and will remain removed from the state review list. Sketch details are still requested for reports' inclusion in *Field Notes*.

VARIED THRUSH *Ixoreus naevius*. Early reports accepted by the committee are of one at Granite L. near Prescott, YAV, 20–21 Dec 1977 (VMi), one at the Parker "oasis," LAP, 23 Dec 1977 (KK), and one in s.w. Phoenix, MAR, 26 Dec 1977 (AHi). Since 1974, at least 60 individuals have been reported statewide, and this species is no longer on the review list. Sketch details are still requested for inclusion of sightings in *Field Notes*.

Figure 3. This Northern Wheatear found near the Pinal Air Park pecan grove near Marana provided a first Arizona record.

Photo by J. and S. Levy and Gale Monson

AZTEC THRUSH *Ridgwayia pinicola*. One in Huachuca Canyon, COS, 30 May–14 Jun 1978 (ph. DD) established the first documented record for Arizona (Danforth 1979; Wolf 1978). Other accepted records are of single birds at Madera Canyon, SCR, 20 May 1978 (MBl), 22–28 Jul 1982 (DEk), 30 Aug–13 Sep 1983 (DKr), 22 Jul 1984 (CHi), 13–17 Aug 1986 (JCa), 27–30 Aug 1989 (ph. JHo), and 19 Aug 1996 (MSt). Reports away from Madera Canyon are of one in Cave Creek Canyon, COS, 11 Aug 1986 (BTi), two in Carr Canyon, COS, 2 Aug–6 Sep 1989 (ph. DTr), one on Mt. Hopkins, SCR, 26 Oct 1991 (SLi), one found during the winter at Portal, COS, 25 Jan–3 Feb 1991 (DPo; ph. DZi; see Am. Birds 45:341), as many as seven individuals in Carr Canyon, COS, 24 Aug–3 Sep 1996 (CDB; ph. GR, MSt; Figure 4), and as many as eight in Miller Canyon, COS, 1–14 Sep 1996 (CMa; ph. JiB; see NASFN 51:98). At least eight additional reports [Aug 1985, Sep 1991, Jul 1992, Sep 1993, Aug 1994 (4)] have been published in Am. Birds/NASFN but not evaluated by the ABC.

GRAY CATBIRD *Dumetella carolinensis*. A report of a very late Catbird was accepted from South Fork, L. C. R., APA, 24 Nov 1977 (DD), and one was accepted from the Bill Williams R., LAP, 25 Sep 1978 (BWh). There are at least 50 reports away from known breeding areas near Springerville in northeastern Arizona; sketch details are still requested for inclusion of reports away from breeding areas in *Field Notes*.

BLUE MOCKINGBIRD *Melanotis caerulescens*. Two records of this Mexican specialty have been accepted by the ABC. One was along Sonoita Creek s.w. of Patagonia, SCR, 21 Dec 1991–6 Mar 1992 (RNt; ph. DTr, GR; see Am. Birds 46:298,332), establishing a first United States record, and the second was at Portal, COS, 4 Jan–4 Apr 1995 (BTa; ph. BSm; Figure 5). The ABC was at first hesitant to accept the record from Sonoita Creek because of the possibility it was of an escaped cage bird. After the Portal record, and new information regarding movements of nonbreeding birds into riparian areas during the fall and winter in Sonora (S. Russell pers. comm.), the ABC is comfortable accepting both records.

Figure 4. This Aztec Thrush in Carr Canyon was one of nearly 20 found in Arizona during August and September 1996.

Photo by Gary H. Rosenberg

WHITE/BLACK-BACKED WAGTAIL *Motacilla alba/lugens*. One immature was at the South Rim of the Grand Canyon, COC, 6–10 Oct 1985 (ph. CRu; see Am. Birds 40:152). Although this individual was for years thought by the ABC to be unidentifiable to species, new information (Sibley and Howell 1998; Morlan 1981) suggests that the Grand Canyon bird was most likely a White Wagtail. An adult White Wagtail was seen at Arroyo Cajon Bonito, Sonora, less than 6 miles south of Arizona, 30 Apr 1974 (Monson and Phillips 1981).

RED-THROATED PIPIT *Anthus cervinus*. The only accepted record of this Siberian pipit for the state is of one from Kayenta, NAV, 12–17 Oct 1989 (ph. CL; see Am. Birds 44:137).

SPRAGUE'S PIPIT *Anthus spragueii*. A few extralimital records away from known wintering areas in southern Arizona have been reviewed and accepted; up to seven were in s.w. Phoenix, MAR, 21 Dec 1974–Mar 1975 (KK), one was at Tucson, PIM, 22 Dec 1977 (KK), and another was in s.w. Phoenix, MAR, 6 Feb 1979 (ph. KVR). Sketch details are still requested for inclusion in *Field Notes* of sightings away from known wintering areas in s.e. Arizona.

BOHEMIAN WAXWING *Bombycilla garrulus*. The only recent sightings to be reviewed and accepted by the committee were of 10 to 14 individuals at Katherine's Landing, L. Mohave, MOH, 12 Jan–6 Feb 1977 (KK). Since 1979, no fewer than nine different reports, one of up to 150 individuals in Flagstaff (Feb 1984; ph. TCo), have been published in Am. Birds/NASFN, but none has been reviewed by the ABC. This species is still on our review list.

BLUE-WINGED WARBLER *Vermivora pinus*. The few accepted records for the state are of one at Eagar, APA, 9 Oct 1982 (DSj), one in Sycamore Canyon, SCR, 24 May 1986 (RLe), one at Coon Bluff, MAR, 14 Jun 1991 (SD), and one at Patagonia, SCR, 12 Oct 1994 (MCh). Four additional reports have been published in Am. Birds/NASFN but have not reviewed by the ABC. Prior to 1982, only one record existed for Arizona, of a specimen from the Bill Williams delta, LAP, 5 Sep 1952 (Monson and Phillips 1981).

GOLDEN-WINGED WARBLER *Vermivora chrysoptera*. One was collected at Quitobaquito, PIM, 3 Nov 1968 (RCu; *UA), one was along the Bill Williams R., LAP, 8 Oct 1978 (BWh), one was at Prescott, YAV, 28 Aug–18 Sep 1982 (VMi), one was at Bisbee, COS, 20 Jun 1986 (DD), one was at Patagonia, SCR, 17 May 1987 (RSt), one was at Montezuma's Castle, COC, 1 Sep 1988 (JPy), one was along the upper S.P.R., COS, 25 Sep 1988 (DKr), one was at Madera Canyon, SCR, 8 Nov 1989–12 Jan 1990 (BHu), one was in Sycamore Canyon, SCR, 6 Jun 1990 (JBl), one was at Clear Creek Campground, YAV, 3 Aug 1991 (BTh), one was at Paloma, MAR, 12–19 Nov 1994 (ph. DKa), and one was e. of Arivaca, PIM, 13 Nov 1994 (JNa). At least seven additional reports have been published in Am. Birds/NASFN (Dec 1977, Aug 1983, Jun 1990, May 1991, Nov 1991, Sep 1992, May 1995), but not reviewed by the ABC.

TENNESSEE WARBLER *Vermivora peregrina*. Early and other scattered records that have been reviewed and accepted by the committee include one at Granite Reef Dam, MAR, 3 Nov 1974 (SHe), one at Tempe, MAR, 5 Oct 1975 (ST), one from Peppersauce Canyon, PIN, 24 Oct 1976 (ST), one from Madera Canyon, SCR, 30 Dec 1989 (JCo), representing one of the few winter records for the state, one from the B.T.A., PIN, 17 Nov 1990 (CBa), one at Empire Ranch along Cienega Creek, PIM, 6 May 1993 (JWh), and one at Granite Creek, Prescott, YAV, 14 Sep 1994 (BPr). Since 1974, there have been at least 75 reports, and the Tennessee Warbler is no longer a review species. Sketch details are still requested for inclusion of sightings in *Field Notes*.

NASHVILLE WARBLER *Vermivora ruficapilla*. Two winter reports were reviewed and accepted by the committee; both are from along the Salt R. in s.w. Phoenix, MAR, one 18 Dec 1974 (RNt), the other at a different locality 21 Dec 1974 (RNt). At least one other winter report has been published in Am. Birds/NASFN but not reviewed by the ABC.

LUCY'S WARBLER *Vermivora luciae*. One winter report was accepted by the ABC, of one along the Salt R. in s.w. Phoenix, MAR, 18 Dec 1976 (KK).

CRESCENT-CHESTED WARBLER *Parula superciliosa*. Arizona's first record was of a male in Garden Canyon, Huachuca Mts., COS, 3–15 Sep 1983 (ph. SSu; see Heathecoate and Kaufman 1985). The next year another male was found in Ramsey Canyon, COS, 28 Apr–17 May 1984 (JBo; ph. NBo), but perhaps more astounding was a bird found at Patagonia, SCR, 11 Sep 1992 (DJo; ph. GR, SFi; see Am. Birds 47:169 & 285) that wintered locally and was last reported 23 Mar 1993. Presumably the same individual was found again the following 13 Nov and remained there until 17 Jan 1994 (DJo). These are the only records of this species for Arizona.

NORTHERN PARULA *Parula americana*. Early records reviewed by the committee included one from s.w. Phoenix, MAR, 2–5 Sep 1974 (RBr), another there 21 Dec 1974–7 Jan 1975 (RW), one from Rustler Park, COS, 31 May 1975 (AZi), and one from Portal, COS, 28 Nov 1975 (WSp). Since 1975, about 100 individuals have been reported statewide, and the number of reports has increased greatly during the past 10 years. The Northern Parula is no longer a review species.

TROPICAL PARULA *Parula pitiayumi*. Arizona's first and only accepted record is of a male along the Mt. Wrightson trail, Madera Canyon, SCR, 14 Jul–13 Sep 1984 (ph. TAr). A female was also reported with the male 18 July (DSj) but was seen only once.

CHESTNUT-SIDED WARBLER *Dendroica pensylvanica*. Early records accepted by the committee are of one at Ft. Huachuca, COS, 14–17 Oct 1974 (DD), one in s.w. Phoenix, MAR, 21 Dec 1974–6 Jan 1975 (ST), one at Portal, COS, 18 May 1975 (MDa), one at Tempe, MAR, 24 Sep 1975 (ST), one at Portal, COS, 19 Oct

1975 (SSp), single birds in Sabino Canyon, PIM, 14 Sep 1976 (TAP), 25 Sep–1 Oct 1976 (BRu), and 13 Oct 1976 (DSz), one in Peppersauce Canyon, PIN, 21 Nov 1976 (DSz), one at Teec Nos Pos, APA, 23 May 1977 (BHa), and one in s.w. Phoenix, MAR, 26–27 Dec 1977 (GR). Since 1974, no fewer than 85 reports have been published in Am. Birds/NASFN, and the Chestnut-sided Warbler is no longer considered a review species; sketch details are still requested for reports' inclusion in *Field Notes*.

MAGNOLIA WARBLER *Dendroica magnolia*. Accepted records are of one from the Bill Williams R., LAP, 24 Dec 1977-23 Jan 1978 (GR; ph. KVR; see Am. Birds 32:386), representing the only winter record for the state, one along the South Fork of the L.C.R., APA, 22 Oct 1978 (GR, KK), one at Kayenta, NAV, 6 Oct 1979 (WCH), one along Bonita Creek, GIL, 18 May 1980 (TCl), one at Ganado, APA, 24 May 1984 (PL), one along the Verde R. n.e. of Phoenix, MAR, 9 Oct 1986 (TGa), one at Ganado, APA, 30 Sep 1987 (DSj), one at the B.T.A., PIN, 20 Oct 1987 (CT), one in Canyon de Chelly, APA, 9 Oct 1989 (RNt), and one along Bright Angel Creek, Grand Canyon, COC, 2 Oct 1990 (TMi, AMi). At least 10 additional reports have been published in Am. Birds/NASFN (May 1979, Sep 1979, Oct 1979, Oct 1980, Oct 1981, Nov 1982, Sep 1984, Nov 1987, May 1989, Oct 1994) but not reviewed by the ABC.

CAPE MAY WARBLER *Dendroica tigrina*. One was at Sunflower, MAR, 30 Oct 1976 (ST, JWz), one wintered at the B.T.A., PIN, 17 Nov 1978–30 Mar 1979 (ph. KVR; see Am. Birds 33:304), one was at Picacho Res., PIN, 15 Oct 1983 (DSj), one was in Tucson, PIM, 10 Dec 1984–11 Apr 1985 (ph. RBo; see Am. Birds 39:197), one was at Parker, LAP, 6 Oct 1988 (DSj), one was along the upper S.P.R., COS, 11–18 Oct 1989 (DKr), and another wintered at Tucson, PIM, 24 Nov 1993–13 Apr 1994 (PMc; ph. JiB, JJo; Figure 6). Five additional reports have been published in Am. Birds (Apr 1977, Jan 1980, Nov 1984, Dec 1984, Dec 1986) but not reviewed by the ABC.

BLACK-THROATED BLUE WARBLER *Dendroica caerulescens*. Records reviewed by the committee prior to 1979 include one at Seven Springs, MAR, 23 Oct 1974 (SMa), one at Tucson, PIM, 25 Oct–11 Nov 1975 (WDa), one in Peppersauce Canyon, PIN, 11 Nov 1975 (WDa), one along the Verde R. on the F.M.I.R., MAR, 21 Nov 1976 (CSf), one at Wupatki N.M., COC, 18 Oct 1977 (PSc), one at Patagonia, SCR, 9 Nov 1977 (JBe), one female along the Bill Williams R., LAP, 10 Oct 1978 (BWh), and one at Yuma, YUM, 23 Dec 1978 (DRo). About 80 reports of the Black-throated Blue Warbler have been published in Am. Birds/NASFN since 1974, and the species is no longer on our review list; sketch details, particularly for females, are still requested for inclusion of sightings in *Field Notes*.

BLACK-THROATED GREEN WARBLER *Dendroica virens*. Accepted records include one at Phoenix, MAR, 15 May 1974 (SD), one in Tempe, MAR, 28 Sep 1975 (ST), one at Chandler, MAR, 6 Oct 1977 (GR), one in s.w. Phoenix, MAR, 3 Nov 1977 (GR), one at Cibola N.W.R., LAP, 23 Oct 1978 (BWh), one at Oak Creek Canyon, COC, 18 Nov 1978 (WCH), one near Fairbank on the upper S.P.R., COS, 21 Sep 1987 (DKr), and one near Onion Saddle, Chiricahua Mts., COS, 2 May 1992 (TCo). About 30 reports have been published in Am. Birds/NASFN since 1974, but relatively few since 1990. The Black-throated Green Warbler will be retained on the state review list.

HERMIT WARBLER *Dendroica occidentalis*. One winter report has been reviewed and accepted; one was in s.w. Phoenix, MAR, 18 Dec 1976 (AGa).

BLACKBURNIAN WARBLER *Dendroica fusca*. Accepted reports are of one at Tempe, MAR, 28 Sep 1975 (ST), one in Peppersauce Canyon, PIN, 21–24 Oct

1976 (DSz), one in Madera Canyon, SCR, 14 May 1978 (JGz), one at Chandler, MAR, 23 Sep 1978 (KK), one at South Fork of the L.C.R. e. of Eagar, APA, 5 Oct 1978 (ph. ST), one at Ganado L., APA, 6 Oct 1978 (KK, GR, ST), one at the B.T.A., PIN, 20–21 Oct 1979 (ph. KVR), another individual at the B.T.A., PIN, 21–22 Oct 1979 (ph. ST), one at the P.A.P. pecan grove, PIM, 7 Oct 1992 (KK), one about 5 mi. s. of St. David along the upper S.P.R., COS, 22 Oct 1992 (DKr), and another about 7 mi. s. of St. David along the upper S.P.R., COS, 11 May 1993 (JWh). Six reports published in Am. Birds (Oct 1979, Oct 1980 (4), Jun 1987) have not been reviewed by the ABC.

YELLOW-THROATED WARBLER *Dendroica dominica*. Accepted records are of one in Guadalupe Canyon, COS, 20 Jul 1975 (RDe), one at Hereford, COS, 26 Dec 1975 (CHl), one along the South Fork of the L.C.R. e. of Eagar, APA, 22 May–7 Jun 1981 (BJo, MHa), one at Patagonia, SCR, 15–20 Mar 1982 (ph. JR), one at the Southwest Research Station, Cave Creek Canyon, COS, 30 Jun–7 Jul 1982 (ECa), one at Ehrenberg, LAP, 5 Sep 1982 (WCH; ph. DKr), one in Madera Canyon, SCR, 21 Jan–5 Apr 1986 (JBo), another there 3 Aug 1986 (RTa), one at Powell Springs Campground near Prescott, YAV, 17 Aug 1986 (JoB), one at the Granite Reef Picnic Area, MAR, 29 Sep–6 Oct 1991 (TCo; ph. SGa; see Am. Birds 46:133), one at Portal, COS, 7–9 May 1992 (JRe), one along the upper S.P.R., COS, 28 Apr 1993 (JWh), one in Pine Canyon, w. side of Chiricahua Mts., COS, 17 Sep 1993 (CBe), and one along the upper S.P.R., COS, 6 Apr 1996 (JNo). Five additional reports have been published in Am. Birds (Apr 1979, Jun 1981, Jul 1981, Sep 1988, Sep 1989) but not reviewed by the ABC.

PINE WARBLER *Dendroica pinus*. This species is one of the scarcer warblers to turn up in Arizona with only four accepted records. The first for the state was at Benson, COS, 6 Nov 1987–11 Jan 1988 (DJo; ph. GR; see Am. Birds 42:18), another one wintered at Mesa, MAR, 10 Dec 1990–4 Mar 1991 (MHb; ph. RW; see Witzeman et al. 1997:145), one was at Portal, COS, 26–31 Mar 1991 (DJa; ph. SSp; see Am. Birds 45:380), and one was in Tucson, PIM, 27–28 Oct 1994 (DTt; ph. DSj).

PRAIRIE WARBLER *Dendroica discolor*. The only documented record for the state is one at Kayenta, NAV, 11 Sep 1990 (ph. GR). Three older sight records, all from Tucson in December and January, were published by Monson and Phillips (1981).

PALM WARBLER *Dendroica palmarum*. Records accepted by the committee are of one collected 10 mi. w. of Tucson, PIM, 8 Nov 1969 (SMR; *UA), one at Seven Springs, MAR, 16 Oct 1974 (SD), one at Kino Springs near Nogales, SCR, 27 Apr 1979 (DGa), one at Portal, COS, 11 Nov 1981 (RMo), one n.e. of Sedona, YAV, 27 Apr 1984 (TCo), one at Tempe, MAR, 11 Oct 1985 (KPa), one at Buckeye, MAR, 16 Nov 1985 (CBa), one at Petrified Forest National Park, NAV, 30 Sep 1989 (JSa), and one at Paloma, MAR, 31 Oct 1992 (CBa). About 40 records have been published in Am. Birds/NASFN since 1974; therefore the Palm Warbler is removed from the state review list. Sketch details are still requested for inclusion of sightings in *Field Notes*.

BAY-BREASTED WARBLER *Dendroica castanea*. Accepted records are of one at Tucson, PIM, 7 Dec 1975 (DSz), still the latest fall record for the state, one at Flagstaff, COC, 9 Jun 1976 (JFi), one at Cook's L., lower S.P.R., PIN, 15 May 1978 (ST), one at Patagonia, SCR, 19 May 1978 (RBa), one along the Bill Williams R., LAP, 9 Oct 1978 (BWh), one at Paloma, MAR, 16–22 Nov 1980 (GR; ph. KVR), one in s.w. Phoenix, MAR, 21 Oct 1987 (DSj), one at Granite Reef Picnic Area, MAR, 24 Sep 1989 (ph. SGa), and one at Portal, COS, 20 May 1990 (CSn). Three additional reports published in Am. Birds (Oct 1978, May 1980, Apr 1982) have not been reviewed by the ABC.

BLACKPOLL WARBLER *Dendroica striata*. The records reviewed and accepted by the committee are of one at Cabeza Prieta N.W.R., PIM, 14 Jun 1968 (SMR; *UA),

one 4 mi. s.w. Red Rock, PIM, 18 Sep 1971 (SSh; *UA), one at Phoenix, MAR, 18–20 Jul 1974 (DSj, ph. TSj; see Witzeman et al. 1997:145), one at Arivaca Junction, PIM, 5 Apr 1975 (PNo), one at Cibola N.W.R., LAP, 29 Apr 1983 (DKr), one at Springerville, APA, 18 Sep 1987 (ph. GR), one along the Santa Cruz R. near Tubac, SCR, 15 Sep 1991 (RHa), one in Sabino Canyon, PIM, 16 Oct 1992 (KK), and one at South Fork of the Little Colorado R., APA, 21 Sep 1994 (ph. RJo). At least 15 additional reports have been published in Am. Birds/NASFN, including seven in 1980, but not reviewed by the ABC.

CERULEAN WARBLER *Dendroica cerulea*. The only documented record for Arizona is of one at Madera Canyon, SCR, 18–20 May 1979 (CCl; ph. GM). One additional sight record was published by Monson and Phillips (1981): a singing male was at Cave Creek Canyon, COS, 28 May 1970 (BSc et al.).

PROTHONOTARY WARBLER *Protonotaria citrea*. Accepted records are of one n. of Tucson, PIM, 10 May 1976 (DSh), one in Sabino Canyon, PIM, 10 Sep 1976 (BJo), one along the Bill Williams R., LAP, 10 May 1977 (KVR), one at St. David, COS, 6 Jun 1978 (DD), one along Bonita Creek near Safford, GIL, 1–5 Jun 1979 (ph. TCl), one at Mesa, MAR, 12 Oct 1980 (CGt, LGt), one at Springerville, APA, 12 Jun 1981 (GR), one at Portal, COS, 6 Oct 1983 (WSp), one at Littlefield, MOH, 19 May 1984 (PL), one in Sabino Canyon, PIM, 10 Oct 1985 (ABr), one in Patagonia, SCR, 30 May 1987 (BSu), one at Portal, COS, 7 Sep 1987 (DLe), one at Phoenix, MAR, 26 Oct 1987 (SD; ph. RW; see Witzeman et al. 1997:145), one at Portal, COS, 23–24 May 1988 (RMo), one at St. David, COS, 26 Oct 1989 (DKr), another there 12 Sep 1990 (DKr), one at Kayenta, NAV, 28 Sep 1991 (CL), one at Glen Canyon Rec. Area, COC, 26 May 1994 (JGr), one at Agua Caliente Park, Tucson, PIM, 10 Sep 1994 (SGo), and one at Portal, COS, 11 Sep 1995 (CGa). About 40 reports have been published in Am. Birds/NASFN since 1974; therefore the Prothonotary Warbler is removed from the state review list. Sketch details are still requested for reports' inclusion in *Field Notes*.

WORM-EATING WARBLER *Helmitheros vermivorus*. One along the upper S.P.R., COS, 18 Apr 1974 (DD), one in the Bill Williams delta, LAP, 10 May 1977 (ph. KVR), one at the B.T.A., PIN, 20–22 Oct 1979 (ph. KVR), one 2. mi. s. of Parker Dam, LAP, 5 Sep 1981 (KVR), one at Portal, COS, 14–15 Apr 1982 (WSp), one near the Arizona–Sonora Desert Museum, Tucson, PIM, 14 May 1982 (PWi), one along the Verde R., F.M.I.R., MAR, 19 Jan 1983 (MLa), representing the first true winter record for the state, one in Whitetail Canyon, Chiricahua Mts., COS, 19 Jul 1985 (RTa), one in Sycamore Canyon, SCR, 18 May 1986 (BNi), one at South Fork, L.C.R., APA, 28 Jun 1987 (RFe), one at Rose Creek Campground near Roosevelt L., PIN, 5 Dec 1987 (FCo), one in Tempe, MAR, 22 Nov 1988–18 Mar 1989 (KGr), one at Cave Creek Canyon, COS, 7 May 1989 (RCa), one at Madera Canyon, SCR, 20–27 Apr 1990 (JHo), one at Ramsey Canyon, COS, 12–15 May 1992 (BGr), one in Scheelite Canyon, 27 May 1992 (AGr), one at the P.A.P. pecan grove, PIM, 2 Oct 1994 (ph. GR), and one in Ramsey Canyon, COS, 12 May 1995 (EHo). An additional 20 reports have been published in Am. Birds/NASFN but not reviewed by the ABC. The Worm-eating Warbler is no longer considered a review species, but sketch details are still requested for inclusion of sightings in *Field Notes*.

SWAINSON'S WARBLER *Limnothlypis swainsonii*. The only record for Arizona, and still the only accepted record of the species west of the Continental Divide, is of a singing male at South Fork of the Little Colorado R., APA, 12 Jun 1981 (s.r. GR, BJo, MHa; see Figure 7).

OVENBIRD *Seiurus aurocapillus*. Early reviewed records are of one in Cave Creek Canyon, COS, 26–29 May 1974 (RNt), one in Tempe, MAR, 15 Sep 1974 (SMa), one in s.w. Phoenix, MAR, 19–21 Dec 1974 (RNt), one in s.w. Phoenix, MAR, 8 Oct 1975 (RNt), one at Portal, COS, 13 May 1977 (MBr), one at Yuma,

YUM, 31 May 1977 (KSp), and one s. of Parker, LAP, 23 Dec 1977 (BEd). There have been more than 75 individuals reported and published in Am. Birds/NASFN since 1974, and this species is no longer on the review list. Sketch details are still requested for inclusion of reports in *Field Notes*.

LOUISIANA WATERTHRUSH *Seiurus motacilla*. Accepted records are of one at California Gulch, SCR, 23 Jan 1966 (BHa; *UA), one at Patagonia, SCR, 25 Sep 1976 (DSz), one netted at Tanque Verde Ranch, Tucson, 31 Jul 1980 (PWa), one at Patagonia, SCR, 18 Dec 1983–13 Mar 1984 (TCo), one at Madera Canyon, SCR, 23 Nov 1984 (HRa), one at Hank and Yank Spring, Sycamore Canyon, SCR, 4 Aug 1985 (DSj), one at Herb Martyr, Chiricahua Mts., COS, 13 Feb 1986 (RPl), one at Patagonia, SCR, 30 Jul–2 Aug 1986 (WWe), one at Seven Springs, MAR, 21–31 Jan 1987 (SD), one in Sabino Canyon, PIM, 17 Sep 1989 (WR), one at Cave Creek Canyon, COS, 2–3 Dec 1989 (DKr), and one at Arivaca L., PIM, 11 Jan 1990 (MCl). Nearly 40 reports have been published in Am. Birds/NASFN since 1974. Although this species is likely a rare but regular winter visitor to rocky mountain streams in the s.e. portion of the state, sketch details are still requested for inclusion of sightings in *Field Notes*.

KENTUCKY WARBLER *Oporornis formosus*. Records include one at Portal, COS, 4 May 1974 (SSp), one in the Winchester Mts. n.w. of Willcox, COS, 5 May 1974 (TP), one in Huachuca Canyon, COS, 8 May 1974 (DD), one at Patagonia, SCR, 11 May 1974 (DD), one at Yuma, YUM, 20 Jun 1976 (KSp), one at Ramsey Canyon, COS, 25 May 1977 (CYu), one in s.w. Phoenix, MAR, 3–5 Nov 1977 (GR), one at Gates Pass w. of Tucson, PIM, 8 Jun 1979 (MEg), one at the bottom of the Grand Canyon, COC, 18 Jun 1979 (RDu), one at South Fork of the L.C.R., APA, 18–21 May 1981 (BJo), one at Cave Creek Canyon, COS, 29 Jun into Jul 1981 (KGa), one at the B.T.A., PIN, 9 Nov 1984 (TCo), one at Comfort Springs, Huachuca Mts., COS, 22 May 1989 (DPe), one near L. Mary, COC, 17 Jun 1992 (PSu), one along the upper S.P.R., COS, 1 Nov 1992 (TCo), one at Cave Creek Canyon, COS, 13–27 May 1993 (PSu), one at San Bernardino N.W.R., COS, 4 Sep 1993 (LMc), and one in French Joe Canyon, COS, 28 Apr 1996 (CGn). About 30 records have been published in Am. Birds/NASFN since 1974; sketch details are requested for inclusion of reports in *Field Notes*, and full details are requested for all fall sightings.

CONNECTICUT WARBLER *Oporornis agilis*. The only documented record for the state is of one found at Tucson, PIM, 15–18 Sep 1979 (RBr; ph. JW, KVR; Figure 8; see Am. Birds 34:189). Another at Middlemarch Rd., COS, 2 Sep 1974 (DD) has also been accepted by the committee.

MOURNING WARBLER *Oporornis philadelphia*. A bird found dead at Pipe Springs N.M., MOH, 31 May 1974 (RWi; *UA; see Wilt 1976) provided Arizona's first record. Other accepted records are of one at Ganado, APA, 15 Sep 1985 (DSj), one at Springerville, APA, 31 Aug 1986 (DSj), one near Charleston along the upper S.P.R., COS, 25 Sep 1988 (DKr), and one at Chandler, MAR, 18 Sep 1995 (RJo). Two additional sight records have been published in Am. Birds/NASFN (Sep 1989, Aug 1993) but not reviewed by the ABC.

HOODED WARBLER *Wilsonia citrina*. Early records reviewed by the committee included one at Portal, COS, 6–7 May 1974 (SSp, WSp), one in the Santa Catalina Mts., PIM, 11 May 1975 (RNt), one in Madera Canyon, SCR, 2 Jul 1975 (FSc), one in Phoenix, MAR, 5 Sep 1975 (RBr), one in Garden Canyon, COS, 25–31 May 1976 (GRd), one at Patagonia, SCR, 14 Sep 1976 (DSz), and one at Round Valley, Chiricahua Mts., COS, 20 May 1977 (MBr). About 100 records, most for spring and early summer, have been published in Am. Birds/NASFN since 1974. Although the Hooded Warbler is no longer a review species, sketch details, particularly of females, are still requested for inclusion of sightings in *Field Notes*.

CANADA WARBLER *Wilsonia canadensis*. Very few records of this warbler have been submitted to the committee; accepted records are of one collected at Pipe Springs, MOH, 29 Sep 1974 (RWi; *UA), one at Sabino Canyon, PIM, 6–7 Sep 1975 (CKa), one found dead in Tucson, PIM, 15 Aug 1979 (MMc; *skeleton UA), one at the B.T.A., PIN, 21–27 Oct 1979 (GR; ph. KVR), one at Tempe, MAR, 23–24 Sep 1981 (ALa), and one in Chandler, MAR, 8 Sep 1992 (CBa). Three additional reports have been published in Am. Birds/NASFN (Oct 1979, Oct 1980, Sep 1993) but not reviewed by the ABC.

SLATE-THROATED REDSTART *Myioborus miniatus*. The first documented Arizona record was of a bird thought to be an immature male in Miller Canyon, COS, 10–15 Apr 1976 (RMo; ph. RNd). Other accepted records are of one in Cave Creek Canyon, COS, 2 May 1978 (CSe), another there 29 Mar 1993 (CEk), and one in Madera Canyon, SCR/PIM, 26 May 1996 (RCh; ph GR, MSt).

FAN-TAILED WARBLER *Euthlypis lachrymosa*. Records accepted by the committee are of one in Scheelite Canyon, COS, 19 May 1983 (GJa), one in Garden Canyon, COS, 24 May 1984 (TSg), one in Sycamore Canyon, SCR, 7 Jun–4 Jul 1987 (DKr; ph. TCo), and one in Guadalupe Canyon, COS, 5–8 Sep 1990 (LMc). One record prior to 1974 was published by Monson and Phillips (1981), bringing the total number of state records to five. An additional report published in NASFN (Jun 1995) has not been reviewed by the ABC.

RUFOUS-CAPPED WARBLER *Basileuterus rufifrons*. The first Arizona record was of a singing male in Cave Creek Canyon, COS, 9 May 1977 (MBr) and a female with a nest and two eggs at the same locality 19 Jul 1977 (ph, MEv). Another or the same individual was at that locality 8 Apr 1978 (KK; see Monson and Phillips 1981). Other accepted records are of one in California Gulch, SCR, 24 Jul 1993 (RSt), one in lower Sycamore Canyon, SCR, 16 Mar–Jun 1994 (CBe; ph. DSj; see NASFN 48:327), and two males in French Joe Canyon, COS, one found 25 May 1995 (JMr; ph. GR; Figure 9), the second 28 May 1995 (MBs; s.r. CBe); both individuals remained on territory into the fall of that year, with only one returning in 1996. One additional report (Aug 1983 from Coronado N.M.) has not been reviewed by the ABC.

SCARLET TANAGER *Piranga olivacea*. Accepted records are of one at Tucson, PIM, 2–5 Nov 1975 (DSz), one at Tempe, MAR, 27–28 Nov 1979 (ph. KVR; see Witzeman et al. 1997:146), one at Portal, COS, 23 Oct 1982 (RMo), one at Sanders, APA, 9 Oct 1988 (DSj), one at Patagonia, SCR, 31 Mar 1990 (ABe), one at Phoenix, MAR, 4 Nov 1994 (RBr), one at Patagonia, SCR, 18 Dec 1994 (MSt; ph. DKa), establishing the first documented winter record for Arizona, and one at the Hassayampa R. Preserve near Wickenburg, MAR, 12 May 1996 (ph. RJo). Eight additional reports have been published in Am. Birds/NASFN (Jun 1978, Jun 1979, May 1981, May 1982, Nov 1987, Dec 1988, Oct 1989, Oct 1993) but not submitted to the ABC.

FLAME-COLORED TANAGER *Piranga bidentata*. The first Arizona record was of a male in Cave Creek Canyon, COS, 11 Apr 1985 (RMo; ph. LPB; see Am. Birds 39:335; Morse and Monson 1985). This male paired with a female Western Tanager, and by mid-July together they fledged a total of three young from two nesting attempts. A nesting pair in Madera Canyon, SCR, first detected 14 Apr 1992 (LDo) and seen throughout the summer, attended a nest that was eventually abandoned. Also in 1992, another pair was located in Ramsey Canyon, COS, 5 May (AGr; ph. GR). This pair remained through the summer, but no nest was ever located. Another nesting pair in Ramsey Canyon, COS, was first detected 10 Apr 1993; its three young hatched in June, the female and young were killed by a predator later in June, and the male was last seen 5 Aug 1993 (SWi, TWo). A single female was in Ramsey Canyon,

COS, 7 Jul 1994 (GR, LT, KK). A male tanager mostly resembling a Flame-colored was located at Bog Springs, Madera Canyon, SCR, 4 May 1995 (SGw, LDo), seen through the summer, and again from 22 Apr 1996 (MSt; ph. GR; see NASFN 49:287) through the following summer. We consider it probably a hybrid between the Flame-colored and Western Tanagers.

AMERICAN TREE SPARROW *Spizella arborea*. One record was reviewed from northern Arizona, of one at Springerville, APA, 24 Nov 1977 (DD). We suspect this species to possibly winter annually in small numbers at this locality and throughout northeastern Arizona. One extralimital record away from known wintering areas in northern Arizona was reviewed and accepted by the committee, of two at Parker, LAP, 11 Feb 1977 (KVR). The American Tree Sparrow will remain a review species for all reports, including those from northern Arizona.

CLAY-COLORED SPARROW *Spizella pallida*. Accepted records are of one at Nogales, SCR, 14 Dec 1974 (DSz), another there 14 Dec 1974 (SBu), one in the L.C.R.V., LAP, 15 Dec 1981 (BWh), one collected e. of Tucson, PIM, 20 Sep 1983 (RBo; *UA), one in Peck Canyon, SCR, 26 Dec 1983 (GSM), one at Ganado, APA, 16 Aug 1985 (RNt), one at Richville, APA, 14 Sep 1985 (WCH), one near Fairbank, upper S.P.R., COS, 16 Sep 1987 (DKr), one near Hereford, upper S.P.R., COS, 7 Oct 1988 (TCo), another near Hereford, COS, 11 Oct 1988 (DKr), one at Kayenta, NAV, 28 Sep 1989 (CL), another there 16 Sep 1991 (CL), and one at the P.A.P. pecan grove, PIM, 18 Sep 1994 (JBo). Nearly 60 individuals have been reported from Arizona and published in Am. Birds/NASFN since 1974. Because of the difficulty in identification of this species, sketch details are still requested for inclusion of sightings in *Field Notes*.

FIELD SPARROW *Spizella pusilla*. Arizona's first accepted record was of a single bird coming to a feeder in Ganado, APA, 10–17 Jan 1980 (ph. MLo; Figure 10). The only other accepted record is of one at Cow Springs L., NAV, 14 Oct 1991 (ph. TCo).

LECONTE'S SPARROW *Ammodramus leconteii*. One at Topock, L.C.R.V., MOH, 29 Nov 1981 (TGa; ph. KVR) still represents the only accepted Arizona record.

LAPLAND LONGSPUR *Calcarius lapponicus*. Reports accepted are of one in s.w. Phoenix, MAR, 17–18 Dec 1976 (KK), one at Poston, LAP, 12 Mar 1977 (AHi, KVR), one at Arivaca, PIM, 30 Oct 1989 (WR), one in the San Rafael grasslands, SCR, 8 Dec 1990–13 Jan 1991 (GSM), one at Many Farms L., APA, 8 Oct 1994 (CL), and one at the Snyder Hill sewage treatment plant, Avra Valley, PIM, 27 Oct 1996 (JWg). At least eight additional reports have been published in Am. Birds/NASFN but not reviewed by the ABC.

SNOW BUNTING *Plectrophenax nivalis*. The only record of this species from Arizona is of a specimen obtained at Littlefield, MOH, 3 Nov 1981 (WBo; Boyce and Elliot 1983).

PYRRHULOXIA *Cardinalis sinuatus*. A single individual at Tuba City, COC, 20 Dec 1986 (ph. SSt) represents the only extralimital record of this species from northern Arizona.

YELLOW GROSBEAK *Pheucticus chrysopeplus*. Accepted records of this visitor from Mexico are of one in Cave Creek Canyon, COS, 7 Jun 1974 (DWi), one at Patagonia, SCR, 21 Jun 1975 (SCa), one in Madera Canyon, SCR, 4 Jun 1977 (PMz), one in Ramsey Canyon, COS, 15–17 Jun 1977 (J&CP), one at Prescott, YAV, 26 Jul 1977 (VMi), one in Madera Canyon, SCR, 20–26 Jun 1981 (RNe; ph. KVR; see Am. Birds 35:969), one in Chino Canyon, PIM, 18 Jul 1981 (CGa), one in Sycamore Canyon, SCR, 12 Aug 1983 (THa), one at Kino Springs near Nogales, SCR, 17 Jul 1987 (WPi), one male near Fairbank, upper S.P.R., COS, 27 Jul 1992 (DKr), one at Patagonia, SCR, 18–21 Jun 1994 (RJo, GMc), and one in Ramsey

Canyon, COS, 27 Jul 1994 (DEc). It should be noted that all the accepted records are from June and July, with one from August.

VARIED BUNTING *Passerina versicolor*. One winter record has been reviewed and accepted, of a single male at St. David, COS, 7 Jan 1975 (AMe).

PAINTED BUNTING *Passerina ciris*. Scattered records reviewed and accepted by the committee include one at Tombstone, COS, 29–31 Jul 1974 (DD), one at St. David, COS, 22 Sep 1974 (DD), one at Portal, COS, 25 Aug 1977 (DWo), a female found dead at Portal, COS, 10 Sep 1980 (RBl; *UA), another there 20 Aug 1983 (RFe), one at Green Valley, PIM, 25–28 Feb 1986 (DGa), one female at Richville, APA, 25 Aug 1988 (GR, DSj), one at Guevavi Ranch near Nogales, SCR, 9 Aug 1991 (JSl), one at the P.A.P. pecan grove, PIM, 31 Aug–19 Sep 1994 (WR), one at Chandler, MAR, 6 Sep 1994 (RJo), and one at Tez Nez lah, NAV, 10 Sep 1994 (RJo). Nearly 70 reports have been published in Am. Birds/NASFN since 1974; this species is no longer on our review list, but sketch details of female-plumaged birds are still requested for inclusion of sightings in *Field Notes*.

DICKCISSEL *Spiza americana*. Early records reviewed and accepted by the committee are of one at Nogales, SCR, 18 Mar–11 Apr 1974 (JBW), one at Tucson, PIM, 15 Feb 1977 (JAm), and one at Springerville, APA, 23 Nov 1978 (DD). At least 85 individuals, mostly from early September to early October, have been reported in Am. Birds/NASFN since 1974. The Dickcissel is no longer on the review list, but sketch details are still requested for reports' inclusion in *Field Notes*.

BOBOLINK *Dolichonyx oryzivorus*. Early reports accepted include one from near Tombstone, COS, 27 Sep 1975 (DD), one from Hereford, COS, 13 Sep 1976 (BYu), one from near Poston, LAP, 8 Jun 1977 (ALa), and one from the Imperial N.W.R., YUM, 12 Jun 1979 (WCH). Nearly 60 reports have been published in Am. Birds/NASFN since 1974. The Bobolink is no longer considered a review species, but sketch details, particularly of females, are still requested for inclusion of reports in *Field Notes*.

RUSTY BLACKBIRD *Euphagus carolinus*. Accepted records are of one in s.w. Phoenix, MAR, 3 Jan 1976 (PNo), one at Guevavi Ranch, Nogales, SCR, 26 Dec 1976 (RNt), one near Kansas Settlement, Sulphur Springs Valley, COS, 5–14 Feb 1977 (BJo), one at Nogales, SCR, 10 Jan 1978 (HAx), one at Lake Havasu City, MOH, 28 Nov 1981–28 Jan 1982 (RFe; ph. KVR), one along the upper S.P.R., COS, 30 Nov–16 Dec 1986 (WCH), another there 16 Dec 1989 (TGo), and one at Nogales, SCR, 26 Nov–10 Dec 1996 (DTt; ph. RJo, video CBe). At least five additional reports have been published in Am. Birds (Nov 1980, Dec 1980, Jan 1981, May 1981, Nov 1988) but have yet to be reviewed by the ABC.

COMMON GRACKLE *Quiscalus quiscula*. Arizona's first Common Grackle was found at Lake Pleasant, MAR, 18 Dec 1984–23 Jan 1985 (TCo; ph. GR). Additional records accepted by the committee are of one at Tanque Verde Ranch, Tucson, PIM, 23 Dec 1984–7 Jan 1985 (LDo, CdW), one 14 mi. n.w. of Willcox, COS, 18 May 1988 (JPr), one at Portal, COS, 25–27 Nov 1988 (RMo; ph. SSp; see Am. Birds 43:148), one at Eagar, APA, 12 Sep 1992 (CBa; ph. BJn), one at Kayenta, NAV, 10 Jun 1994 (TC), and one at Springerville, APA, 15 Sep 1995 (GR). No fewer than 18 additional sight records, many of which are from northern Arizona, have been published in Am. Birds/NASFN but not reviewed by the ABC.

BLACK-VENTED ORIOLE *Icterus wagleri*. The only accepted record of this Mexican species from Arizona is of an adult male at Patagonia L., SCR, 18 Apr 1991 (ph. JGi; Figure 11; see Am. Birds 45:512).

ORCHARD ORIOLE *Icterus spurius*. Accepted records are of one in s.w. Phoenix, MAR, 11 Jan 1974 (RW), one in Tempe, MAR, 2 Oct 1975 (ST), one at

Paloma Ranch, MAR, 14 Jun 1980 (ST), another there 1 Oct 1981 (GR, ph. KVR), one at Patagonia, SCR, 24 May 1982 (RSt), one at South Fork of the L.C.R., APA, 14 Sep 1985 (RNt), one at Topock, MOH, 9 Nov 1985 (DSj), one at Kayenta, NAV, 23 Sep 1990 (CL), one in Cave Creek Canyon, COS, 24 Apr 1994 (KDi), and one in Phoenix, MAR, 10 Jun 1996 (CBa). At least 11 additional reports published in Am. Birds/NASFN since 1974 have not been reviewed by the ABC.

STREAK-BACKED ORIOLE *Icterus pustulatus*. Accepted records comprise one from Tucson, PIM, 17 Dec 1975–12 Jan 1976 (ph. PL), one from Green Valley, PIM, 26 Feb–11 May 1988 (JKi), which returned to the same area during the winter of 1989, and one female with nest at the P.A.P. pecan grove, PIM, 9 Jun–13 Jul 1994 (GHe, MSt). Since 1990, a small population has resided along the lower San Pedro R., near Dudleyville, PIN (ph. TCo; Corman and Monson 1995). Single individuals were seen during winter at Cook's Lake 1990–1993.

BALTIMORE ORIOLE *Icterus galbula*. Reports reviewed and accepted include one from Ft. Bowie Nat. Historic Site, COS, 30 Apr 1974 (MHo), one male in n.w. Tucson, PIM, 21 Apr to early May 1978 (BKe), one male in Portal, COS, 3–9 May 1978 (ph. SSp), one male along the Verde R., F.M.I.R., MAR, 5 May–8 Jun 1980 (ph. ST), and one male at Prescott, YAV, 19–23 Aug 1987 (ph. VMi; see Am. Birds 42:116). These are some of the more than 20 reports published in Am. Birds/NASFN since 1974. This species remains on our review list.

GRAY-CROWNED ROSY-FINCH *Leucosticte tephrocotis*. The only report reviewed by the ABC was of ten collected at the Snow Bowl outside Flagstaff, COC, 3–25 Feb 1967 (SCs; *UA).

BLACK ROSY-FINCH *Leucosticte atrata*. The only reports accepted by the ABC were of one with many Gray-crowned Rosy-Finches at the Snow Bowl outside Flagstaff, COC, 16 Feb 1967 (SCs; *UA) and a flock of about 80 along Highway 89 at the Echo Cliffs, s. of Page, COC, 29 Nov 1996 through the following winter (TC, CL; ph TC, GR).

RECORDS NOT ACCEPTED

PILEATED FLYCATCHER *Xenotriccus mexicanus*. A flycatcher thought to be this species from Cave Creek Canyon, COS, 4 Jun 1988 was most likely a Cordilleran Flycatcher (*Empidonax occidentalis*).

YELLOW-BELLIED FLYCATCHER *Empidonax flaviventris*. A bird thought to be this species was described from Sierra Vista, COS, 6 May 1977, but the details were insufficient to substantiate it as a Yellow-bellied.

ALDER FLYCATCHER *Empidonax alnorum*. A bird identified as a Traill's Flycatcher was heard giving a "peek" call note at Becker L., Springerville, APA, 20 May 1984. Although this bird may indeed have been an Alder Flycatcher, the ABC cannot accept such a record solely on the basis of a written description.

LEAST FLYCATCHER *Empidonax minimus*. Six reports of this species have been reviewed by the committee, of one from Tucson, PIM, 18 Apr 1974, one from South Fork of the L.C.R., APA, 22 Jun 1974, one from St. John's, APA, 30 May 1975, one from Eagar, APA, 30 Aug 1986, one from the upper S.P.R., COS, 30 Nov 1986, and another from along the upper S.P.R., COS, 16 May 1988. The committee has found it very difficult to accept sight records of this species without photographs, owing mainly to the difficulty in distinguishing it from some Dusky Flycatchers (*E. oberholseri*).

NUTTING'S FLYCATCHER *Myiarchus nuttingi*. An idenification of this species from Picacho Res., PIN, 19 Aug 1986 was based almost entirely on the interpretation of an orange, as opposed to pink, mouth-lining. Although other field characters were

Figure 5. Arizona's second Blue Mockingbird, found in Portal 4 January 1995 and remaining there into April.

Photo by Brian Small

mentioned in the description, the bird was considered to be a juvenile. In this plumage differences between this species and Ash-throated Flycatcher (*M. cinerascens*) such as the pattern of dark in the tail do not apply. Without a photograph or specimen, and, perhaps just as importantly, a description of the voice, the committee is not prepared to accept a sight record of a Nutting's (see Zimmerman 1978). An additional sighting of a possible Nutting's Flycatcher (see Bowers and Dunning 1987) has yet to be evaluated by the ABC.

BROWN-CRESTED FLYCATCHER *Myiarchus tyrannulus*. Two winter reports, of one at Yuma, YUM, 23 Dec 1974 and one at Quitobaquito, PIM, 26 Jan 1984 were not accepted beccause the details submitted did not rule out the Ash-throated Flycatcher. There are no valid winter records of this species in Arizona (Monson and Phillips 1981).

GREAT KISKADEE *Pitangus sulphuratus*. Details submitted to the committee in these two reports were insufficient for acceptance: four together at Muleshoe Ranch, COS, 26 Jul 1984, and one in Cave Creek Canyon, COS, 2 Jul 1989.

THICK-BILLED KINGBIRD *Tyrannus crassirostris*. The report of one from Prescott, YAV, 22 Jul 1985, which would be the northernmost record for the state, although thought by most members to be "probably correct," was not accepted because the description was inadequate.

NORTHERN SHRIKE *Lanius excubitor*. Details submitted of one at Nogales, SCR, on 4 Oct 1986 were not sufficient to substantiate this species on a remarkably early date.

BELL'S VIREO *Vireo bellii*. A winter report of this species from Coon Bluff on the Salt R., MAR, 16 Jan 1976 was unconvincing.

Figure 6. This Cape May Warbler spent most of the winter of 1993–1994 in a yard in Tucson.

Photo by Jim Burns

YELLOW-THROATED VIREO *Vireo flavifrons*. The report of one from along Sonoita Creek near Patagonia, SCR, 12 May 1979 described a bird with white not yellow spectacles, suggesting a Yellow-breasted Chat (*Icteria virens*). A description of one at Rustler Park, COS, 27 Aug 1980 was not detailed enough to support a record of this species from such a high elevation.

PHILADELPHIA VIREO *Vireo philadelphicus*. A singing male was reported from Portal, COS, 25 May 1974, and although the song was described correctly for this species, the description of the bird lacked sufficient detail. The description of one from Sabino Canyon, PIM, 29 Mar 1980 better fit a bright western Warbling Vireo. The photos of one reported from s.w. Phoenix, MAR, 15 Oct 1981 were not diagnostic for this species. Details of one reported from the Tumacacori Mts, SCR, were not detailed enough to eliminate the Orange-crowned Warbler (*Vermivora celata*). Another reported from Guevavi Ranch, COS, 10 May 1986 was unconvincing.

YELLOW-GREEN VIREO *Vireo flavoviridis*. Three Yellow-green Vireos were reported and may have been correctly identified but the descriptions were all insufficient to eliminate a bright fall Red-eyed Vireo and to support such a rarity in Arizona: one in Cave Creek Canyon, COS, 31 Aug 1974, one in Sycamore Canyon, SCR, 8 Aug 1988, and one along the upper S.P.R. 6 Jul 1989.

GOLDEN VIREO *Vireo hypochryseus*. An intriguing report of one from an experienced observer in e. Tucson, PIM, 20 May 1981, was not accepted because no photo or specimen was obtained, necessary for acceptance of a species new to the U.S.

TUFTED JAY *Cyanocorax dickeyi*. The report of one at Madera Canyon, SCR, 24 Aug 1977 lacked enough details for acceptance.

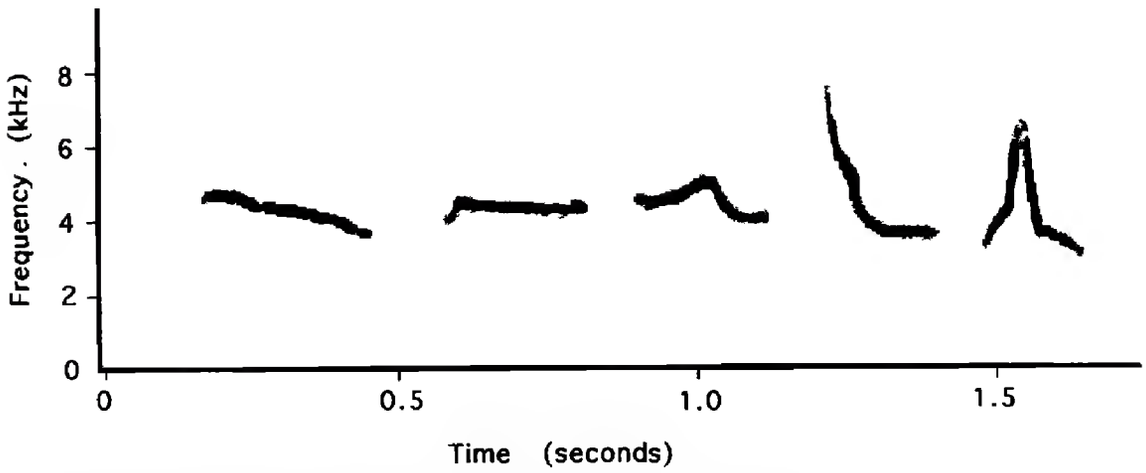

Figure 7. Sonagram of Arizona's first and only Swainson's Warbler, tape recorded at South Fork of the Little Colorado River 12 June 1981.

Sound recording by Gary H. Rosenberg

BROWN JAY *Cyanocorax morio*. Reports of two individuals at Nogales, SCR, 23 Nov 1980 and one at Portal, COS, 15 Sep 1981 were unconvincing; even if the birds were correctly identified, the committee would question their origin.

BLACK-BILLED MAGPIE *Pica pica*. Three magpies reported from southern Arizona were all probably identified correctly but were not accepted because of a serious question of origin: one at Phoenix, MAR, 17 Jan 1983, one in Sabino Canyon, PIM, 27 Oct 1985, and one in the Salt R. Indian Res., MAR, 28 Mar 1988.

MEXICAN CHICKADEE *Parus sclateri*. An extralimital report of one from Mt. Lemmon, Santa Catalina Mts., PIM, was not accepted, the bird thought possibly to have been a wet, molting Mountain Chickadee (*P. gambeli*).

SEDGE WREN *Cistothorus platensis*. Details of a reported Sedge Wren submitted from Poston, LAP, 23 Dec 1981 were inadequate for acceptance of a first state record.

BLACK-CAPPED GNATCATCHER *Polioptila nigriceps*. Reports of this species from along Sonoita Creek, s.w. of Patagonia, SCR, 22 Jun 1974, 29 May 1975, and 8 Jun 1975 were all insufficiently detailed for acceptance. Additional reports from near Sabino Canyon, PIM, 21 Feb 1993 and from along Burro Creek, MOH, 6 Mar 1995 were both well away from areas of known occurrence.

SLATE-COLORED SOLITAIRE *Myadestes unicolor*. A very brief report of this species from Portal, COS, 21 Apr 1977 was inadequate for acceptance of a first U.S. record. The bird was most likely a Townsend's (*M. townsendi*).

VEERY *Catharus fuscescens*. The details submitted for one reported from Prescott, YAV, 29 May 1996 did not rule out a bright northwestern Swainson's or Russet-backed Thrush (*C. ustulatus ustulatus*).

GRAY-CHEEKED THRUSH *Catharus minimus*. Reports of one n.e. of Phoenix in the Mazatzal Mts., MAR, 25 May 1975 and another in Cave Creek Canyon, COS, 16 Oct 1975 were not detailed enough to support a second state record.

RUFOUS-BACKED ROBIN *Turdus rufopalliatus*. An extralimital report of one from Quartzsite, LAP, 28 Feb 1985 was not complete enough to accept.

AZTEC THRUSH *Ridgwayia pinicola*. Details submitted for the following records were all inadequate for acceptance: one in Garden Canyon, COS, 23 Jul 1982, one

Figure 8. Arizona's first documented Connecticut Warbler at Tucson 15–18 September 1979.

Photo by Janet Witzeman

in Madera Canyon, SCR, 14 Oct 1982, one in Cave Creek Canyon, COS, 29 May 1985, and one in Scotia Canyon, COS, 26 Apr 1986.

SPRAGUE'S PIPIT *Anthus spragueii*. Two records of this species were thought to be probably correct, but the descriptions were not detailed enough to substantiate them: one in Phoenix, MAR, 21 Dec 1974 and another in Aravaipa Canyon, PIN, 6 Nov 1975.

BOHEMIAN WAXWING *Bombycilla garrulus*. A flock of five was reported 14 mi. n.w. of Willcox, COS, on the very late date of 26 May 1987. Although the description sounds adequate for the Bohemian, the committee could not accept such an unseasonal record without some form of physical documentation.

TENNESSEE WARBLER *Vermivora peregrina*. A report from s.w. Phoenix, MAR, 25 Aug 1974 was unconvincing.

NASHVILLE WARBLER *Vermivora ruficapilla*. One reported in winter from Patagonia, SCR, 15 Dec 1974 was poorly described.

TROPICAL PARULA *Parula pitayumi*. Insufficient detail supported what would have been a second state record of this species, of one reported from Patagonia, SCR, 1 Feb 1987.

MAGNOLIA WARBLER *Dendroica magnolia*. A bird described as having a "whitish" throat was not accepted from Phoenix, MAR, 5 Sep 1975.

BLACK-THROATED GREEN WARBLER *Dendroica virens*. One reported from Tucson, PIM, 11 Jul 1987 was poorly described.

PINE WARBLER *Dendroica pinus*. A bird seen in Garden Canyon, COS, 20 Oct 1979 was not substantiated as a Pine Warbler and may have been a juvenile Olive Warbler (*Peucedramus taeniatus*).

Figure 9. This Rufous-capped Warbler was one of two males that summered in French Joe Canyon in 1995.

Photograph by Gary H. Rosenberg

PALM WARBLER *Dendroica palmarum*. A description of a bird at the B.T.A., PIN, 30 Jul 1989 was incomplete and not acceptable for a Palm Warbler, although the identification was probably correct.

BAY-BREASTED WARBLER *Dendroica castanea*. Although the bird was almost certainly a Bay-breasted, the description of one reported from Sunflower, MAR, 24 Apr 1982 was inadequate to substantiate the record.

BLACKPOLL WARBLER *Dendroica striata*. An adult female was reported from Many Farms, APA, 22 May 1988, but aspects of the description, back pattern and color in particular, were inconsistent with the identification.

PROTHONOTARY WARBLER *Protonotaria citrea*. One reported from Patagonia, SCR, 7 Jul 1981 was only sketchily described, and a female Yellow Warbler was not eliminated.

WORM-EATING WARBLER *Helmitheros vermivorus*. One seen at Portal, COS, 21 May 1981 by a very experienced observer was supported by details insufficient to substantiate the record. Others reported from South Fork of the L.C.R., APA, 23 May 1981 and near Dos Cabezas, COS, 22 Sep 1985 and were also probably correctly identified, but the details to confirm this were lacking.

SWAINSON'S WARBLER *Limnothlypis swainsonii*. Birds reported as this species from Tucson, PIM, 19 May 1975 and Patagonia, SCR, 8 Sep 1985 were not described adequately to support only a second record west of the Rocky Mts.; some sort of physical documentation, or at least excellent details submitted by multiple observers, is needed to substantiate this species in Arizona.

Figure 10. Arizona'a first Field Sparrow came to a feeder in Ganado, 10–17 January 1980.

Photo by M. Loder

LOUISIANA WATERTHRUSH *Seiurus motacilla*. Birds reported from Cave Creek Canyon, COS, 21 Jun 1985, Ramsey Canyon, COS, 18 Jul 1985, and Patagonia, SCR, 27 Jan 1986 were all most likely identified correctly, but the details submitted failed to rule out the Northern Waterthrush (*S. noveboracensis*) completely.

CONNECTICUT WARBLER *Oporornis agilis*. The description of one reported from the Verde R., F.M.I.R., MAR, 16 Aug 1981 failed to rule out other confusing species of *Oporornis* warblers.

MOURNING WARBLER *Oporornis philadelphia*. The identification of reported from Ganado, APA, 4 Sep 1989 was most likely correct, but the details submitted do not substantiate this difficult-to-identify species.

MACGILLIVRAY'S WARBLER *Oporornis tolmiei*. A winter report of this species at Litchfield Park, MAR, 18 Dec 1976 did not adequately rule out a number of other species more likely at that date and locality.

SLATE-THROATED REDSTART *Myioborus miniatus*. One, reportedly with "deep red" underparts, was sketchily described from Portal, COS, 12 May 1984. Another report of one near Canelo Hills, COS, 19 Mar 1985 sounded more like a Vermilion Flycatcher. A report from Sawmill Canyon, COS, 13 Jul 1988 sounded more promising, but the details submitted failed to rule out juvenile Painted Redstart.

RUFOUS-CAPPED WARBLER *Basileuterus rufifrons*. A report of this species at Comfort Spring, Carr Canyon, COS, 7 April 1985 was reluctantly not accepted because the details were too sketchy for a species so rare in the state.

GOLDEN-BROWED WARBLER *Basileuterus belli*. An intriguing report of one from Cave Creek Canyon, COS, 12 Apr 1978 was not substantiated with a photo or specimen and therefore was not acceptable as a first U.S. record.

SCARLET TANAGER *Piranga olivacea*. Several reports of this species were considered not acceptable for a variety of reasons: one seen at Tucson, PIM, 3 Nov 1975 by skilled observers was too sketchily described. The description of a female in Madera Canyon, SCR, 28 Aug 1987 did not adequately rule out a "yellow-green" Summer Tanager and would have represented, by far, the earliest fall record for the state. Two reports from the upper S.P.R., COS, 15 Oct 1987 and 8 Oct 1988, both possibly correct, failed again to rule out the Summer Tanager. An adult male at Patagonia, SCR, 24 Apr 1992 was described too briefly.

FLAME-COLORED TANAGER *Piranga bidentata*. Although generally described well, one on Mt. Lemmon, PIM, 18 Aug 1982, three years before the first accepted record for the state, was not documented sufficiently.

CLAY-COLORED SPARROW *Spizella pallida*. The ABC has taken a very conservative view with the identification of this species. The following reports did not meet the committee's criteria for acceptance: one n.e. of Sonoita, SCR, 24 Oct 1976, one at Portal, COS, 11 Jan 1978, one near Cibola N.W.R. 28 Aug 1982, one near Show Low, NAV, 20 Sep 1987, one along the upper S.P.R., COS, 14 Sep 1988, another there 22 Sep 1988, one near Nogales, SCR, 25 Nov 1988, one at Portal, COS, 30 Dec 1990, and one at Clay Springs, NAV, 7 Jun 1992.

FIELD SPARROW *Spizella pusilla*. Two reports of this species, one from near Tubac, SCR, 29 Dec 1974, the other from Tucson, PIM, 22 Dec 1987, were both unconvincing, and neither was documented physically.

NELSON'S SHARP-TAILED SPARROW *Ammodramus nelsoni*. A brief report of one at Tucson, PIM, 4 Nov 1982 was not complete enough to substantiate a first state record.

LAPLAND LONGSPUR *Calcarius lapponicus*. One at Greaterville, SCR, 25 Mar 1973 was reported to the committee in 1985, and the details were too sketchy for acceptance.

SMITH'S LONGSPUR *Calcarius pictus*. A longspur in the San Rafael Valley, SCR, 26 Oct 1975 was seen briefly and identified as this species because it had a "white wing patch" and was very "buffy" underneath. This record was not accepted because more documentation is needed to substantiate such a rare occurrence; there is still only one record for the state, of a specimen collected in the White Mts. (Monson and Phillips 1981).

GRAYISH SALTATOR *Saltator caerulescens*. A brief report of a bird identified as this species at Portal, COS, 8 Jul 1978 was not acceptable as a first U.S. record.

YELLOW GROSBEAK *Pheucticus chrysopeplus*. An out-of-season individual, approachable to within three feet, at Tucson, PIM, 27 Oct 1987, was considered identified correctly but of questionable origin. Another seen flying across a road in Cave Creek Canyon, COS, 17 Jul 1988 was seen too briefly for acceptance.

BLUE-BLACK GROSBEAK *Cyanocompsa cyanoides*. Two birds reported from near Yuma, YUM, 4–13 Sep 1974, behaved all wrong for this normally shy and skulking sedentary neotropical species and were not accepted for a first U.S. record.

PAINTED BUNTING *Passerina ciris*. A female of this species reported from St. David, COS, 7 Jan 1975 was not described well enough, and another female reported from Portal, COS, 24 Aug 1987 was seen not through binoculars and too briefly for acceptance.

DICKCISSEL *Spiza americana*. A Dickcissel reported from Tempe, MAR, 16 Sep 1975 was not described well enough for acceptance.

Figure 11. Black-vented Oriole at Patagonia Lake State Park 18 April 1991.

Photo by J. Gilmore

RUSTY BLACKBIRD *Euphagus carolinus*. The description of an individual reported from Willcox, COS, 2 Mar 1986 lacked critical features, such as eye coloration, and was not accepted by the committee.

ORCHARD ORIOLE *Icterus spurius*. Details submitted for a female reported from Madera Canyon, SCR, 21 May 1996 did not rule out the similar Hooded Oriole (*I. cucullatus*).

STREAK-BACKED ORIOLE *Icterus pustulatus*. An immature male reported from Patagonia L., SCR, 7–25 Dec 1975 was likely identified correctly, but the details submitted failed to substantiate the record. Another oriole at Arivaca, PIM, 3 Dec 1990 through the winter was also most likely a Streak-backed, but the observers failed to describe the color of the undersurface of the tail, a feature critical in distinguishing this species from the immature male Bullock's Oriole (see Kaufman 1983).

AUDUBON'S ORIOLE *Icterus graduacauda*. A bird identified as this species in Madera Canyon, SCR, 15 Jul 1975 was almost certainly a Scott's Oriole (*I. parisorum*).

BRAMBLING *Fringilla montifringilla*. Insufficient details were submitted for a bird that was likely a Brambling at Cottonwood, YAV, 13 Dec 1983. This prospective first Arizona record needed to include some form of physical documentation.

COMMON REDPOLL *Carduelis flammea*. A bird described as a Common Redpoll seen at the North Rim of the Grand Canyon, COC, on the incredibly early date of 8 Aug 1992, was not documented well enough to support such an implausible record.

CONTRIBUTORS

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NOTES

FIRST SOOTY TERN NEST IN THE CONTIGUOUS WESTERN UNITED STATES

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During regular surveys of tern colonies at the Western Salt Works in southern San Diego Bay, John Konecny and I discovered a single Sooty Tern (*Sterna fuscata*) nest with one egg on a dike on 3 June 1997. This constitutes the first nesting record of this species for California and for the mainland western United States. The nest was preceded by a spate of sightings at this location starting in 1996. The two adults suffered predation, apparently by a Peregrine Falcon (*Falco peregrinus*), within one week of the nest's discovery. The carcasses of the adults and the egg were deposited at the San Diego Natural History Museum, furnishing California's first Sooty Tern specimens (SDNHM 49807, egg and female; 49966, male).

The Western Salt Works is an industrial salt-production facility composed of numerous shallow evaporation ponds surrounded by narrow earthen dikes approximately 2–20 meters wide, located at the extreme southern end of San Diego Bay, San Diego Co., California. Its combination of interspersed foliage and bare ground, nearby foraging areas, and sheltered waters makes it an excellent site for nesting terns, skimmers, and shorebirds. The U.S. Fish and Wildlife Service has been monitoring the colonies at this site in recent years with biweekly visits throughout the breeding season. Other tern species known to nest at this site are the Caspian (*Sterna caspia*), Royal (*S. maxima*), Elegant (*S. elegans*), Forster's (*S. forsteri*), Least (*S. antillarum*), and Gull-billed (*S. nilotica*).

The Sooty Tern is a relatively recent addition to California's avifauna, with the first accepted record in 1982 (Webster et al. 1990). In 1995, this species was noted throughout the summer at Bolsa Chica, Orange Co. (Hamilton and Willick 1996). The nesting colonies nearest southern California are off Baja California at Las Rocas Alijos and in the Hawaiian Islands (Harrison 1983, Pitman 1985). In 1996, Sooty Terns (a pair) were first seen at Western Salt Works by John Konecny and others. Also during that year, Tricia Campbell saw a pair copulating at the mouth of the Santa Margarita River, San Diego Co. In 1997, Bob James and I first noted a single bird at Western Salt on the morning of 15 April, and others saw it the morning of 16 April. No sightings were noted again until 30 May, when Konecny, others and I noted a pair roosting at the intersection of two dikes. On 3 June, Konecny, Eric Hein, and I found one adult Sooty Tern incubating a single egg at this site. The nest was just a scrape in the ground between two shrubs, with no nesting material lining it, located within a mixed colony of Forster's Terns, Least Terns, and Black Skimmers (*Rynchops niger*). The second adult was nowhere in sight, but Sooty Terns forage far out at sea and take 24-hour incubation shifts (Bent 1921). Upon our approach to the nest, the Sooty Tern did not engage in typical ternlike nest defense behavior (i.e. defecating, swooping, vocalizing, pecking) but rather walked 10 meters away to watch us. We examined the egg and nest, and Konecny photographed it and the adult. When we moved a short distance away, the bird resumed incubation despite the other terns' still trying to drive us away. On 6 June, Konecny and Susan Wynn found one adult still incubating the nest; the remains of the other adult were lying about 10 meters distant. The remains consisted only of the wings, pectoral girdle, sternum, and a severed head, surrounded by numerous body feathers. An immature male Peregrine Falcon had been noted in the area on several occasions during 1997, feeding on terns and shorebirds. On 10 June, Konecny and I found the remains of the second adult 10 meters from the nest; the egg

was still in the scrape. The adult had the skin stripped from the head and neck, and the breast and internal organs had been removed. The specimens were deposited at the San Diego Natural History Museum, where Philip Unitt prepared the female as a flat skin (headless) and complete skeleton, the male as just the set of wings and severed head dried and stored in a plastic bag. Preparation of the egg by William T. Everett proved that it was fertile (Unitt pers. comm.).

The subspecies identity of these birds can not be resolved in lack of a worldwide revision of the subspecies of the Sooty Tern. The San Diego female has a lightly gray-tinged lower belly and crissum like all Sooty Terns of the Pacific Ocean; nominate *fuscata* of the Atlantic has these areas essentially pure white. The supposed subspecies *crissalis* of the eastern Pacific has apparently never been compared adequately with *oahuensis* of the central Pacific and *nubilosa* of the western Pacific. In Cramp (1985), C. S. Roselaar wrote that its recognition is "perhaps not warranted."

The lack of defensive behavior by the incubating adults made them easy targets for predators. Bent (1921) noted that in large colonies Sooty Terns typically engage in aggressive defense behaviors, much like other terns. The lack of aggressive nest defense by solitary pairs and the species' prolonged incubation and fledging periods, exceeding those of other species in the colony that might afford some protection, may render the successful colonization of San Diego Bay by Sooty Terns unlikely.

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BOOK REVIEWS

Breeding Birds of Washington State. Volume 4 in Washington State Gap Analysis—Final Report, by Michael R. Smith, Philip W. Mattocks Jr., and Kelly M. Cassidy. 1997. Seattle Audubon Society Publications in Zoology No. 1. 538 pages, with 258 figures. Paperback, $35. ISBN 0-914516-09-4.

This volume is one of a series of five gap-analysis volumes for Washington state; the others treat the distribution of mammals, amphibians and reptiles, land cover, and a summary of the gap analyses. It describes the breeding distribution of 257 bird species in the state, including all current and two extirpated breeders; the distributions of 244 species are described through both maps and species accounts. Because Washington's breeding avifauna has not been treated definitively since 1953, when 225 breeding species were known (Jewett, Taylor, Shaw, and Aldrich, *Birds of Washington State*), a new work has been long overdue.

This work is an intriguing marriage of two very different methods of describing breeding-bird distributions: gap analysis and a breeding-bird atlas. Such a combination holds great promise for monitoring changes in the status of breeding populations but also has the potential of numerous pitfalls.

Data collection for a breeding-bird atlas project may vary between atlases but always relies on field data collected during certain periods in pre-determined atlas blocks. Atlas data are presented in "raw" format, on a block by block basis, and are never extrapolated from adjoining blocks with similar habitat, earlier time periods, or expert judgment. Field collection of atlas data is very labor intensive, and this alone makes atlas efforts difficult to repeat on a frequent basis. Gap analysis, however, offers an alternative approach to mapping breeding distribution, one that is conducive to frequent repetition.

The core of gap analyses are models of each species' breeding-habitat preferences and breeding-range limits overlaid on a land-cover map of the state derived from Landsat images. These models can be constructed from a variety of sources: literature searches, review of field notes, interviews of active field ornithologists and birders, atlas data, Breeding Bird Survey data, directed searches for certain species, etc. There is no requirement for a specified time period for collection of these types of estimates, as it is expected that habitat preferences will not vary over time nearly as much as the amount of each habitat. The advantages to this monitoring method are enormous. As soon as new Landsat data are available and the land-cover map is updated, estimates of the change in suitable breeding habitat and therefore the change in breeding population can be provided. As the human population of Washington pushes towards seven million by the year 2010, gap analysis can provide critical estimates of impacts of this growth on breeding birds in a much shorter time than would be possible with an atlas-based effort.

The atlas portion of this volume presents the data from the Washington Breeding Bird Atlas project, collected over an 11-year period from 1986 to 1996. Atlas blocks were defined as quarters of township/range blocks. More than 600 volunteers contributed countless hours and miles to this effort, but statewide coverage was far from uniform. This results in maps such as that for the Violet-green Swallow, with about 250 blocks shown in the Puget Trough and fewer than 30 blocks on the outer coast. Seven of the state's 39 counties account for 50% of the atlas records. These seven include the state's two most populous counties (King and Pierce), and they appear to have been covered thoroughly. There is little discussion of the adequacy of coverage, however, and it must be inferred from the graphics. In comparison, the Monterey County atlas (Roberson and Tenney 1993) devoted three pages and eight figures to description of both coverage goals and coverage realized.

The gap models were used to make the maps of predicted distributions, but those predictions were never tested. And therein lies one of the major disappointments in

this effort. While a portion of the atlas data could have been used to validate some or all of the distribution models, instead they were all used to help formulate the models. Neither was any systematic verification of predicted distributions conducted on the ground. Models are difficult to trust without some attempt to characterize their precision and accuracy; a validation effort can provide one measure of confidence limits, as can quantitative investigation of the input data. Some of the input data, such as interviews of field ornithologists, are relatively subjective. Some standardized tests of these persons' knowledge would have provided model users with a sense of the consistency of such input. The methods section implies that range limits were determined solely from "known locations," without defining the term, and thus implies a high degree of precision for this variable. In reality, many of the range limits used in the model were based on interviews with field workers. Thus, from a statistical perspective, the models presented in this work are unverified and of unknown precision and accuracy.

The bulk of the volume is devoted to the maps and accompanying species accounts. My review of the maps, based on personal knowledge, found them generally accurate and informative. The errors that I noted were generally small; they were invariably a result of inadequate atlas coverage and secondarily a failure to elicit ancillary data from field workers. For instance, the Black-capped Chickadee map does not extend to the northwest corner of the Olympic Peninsula because no atlas blocks were completed there and the gap model did not extend the range to that corner of the state. Similarly, neither the Virginia Rail nor Sora is mapped as a breeder in the Chehalis valley, owing both to a lack of atlas data and an apparent failure by field workers to communicate well-known breeding locations. I did not detect any errors resulting from the scale of the land-cover map. The maps were based on 100-hectare polygons for terrestrial cover and 40-hectare polygons for wetlands, apparently a scale detailed enough to portray breeding distributions in Washington accurately.

The accompanying species accounts include a summary of breeding status and distribution, a description of the habitat preference/range limit model developed for that species, and a comments section. The comments sections often provide a summary of recent literature on the species in Washington, sometimes point the reader to unpublished field work, sometimes discuss subspecific or regional differences, and generally describe changes in status since 1953. The only portion of the comments section that I found disturbing was reference to population-trend analysis from Breeding Bird Survey data: there is no description of the methods employed for trend analysis, and the cited document is unpublished! From 1966 to 1991, the House Wrens was reputed to be increasing at a rate of 8.3% per year, the Hermit Thrush at 11% per year. I am confident that these "trends" are artifacts of the locations of the few BBS routes run two decades ago, but a reader with little knowledge of Washington might assume wrongly that the state was stuffed with these two species. The trends are presented on a statewide basis, leaving the reader to guess whether the Barn Swallow's decline of 3.6% per year from 1982 to 1991 was a function of westside urbanization and/or eastside agricultural changes. The trend analyses appear to have been an afterthought, appear misleading, and should have been left out.

Notwithstanding the reservations I have expressed, this book does represent a valuable contribution. This is a pioneering effort at combining gap analysis with atlas techniques, a combination I believe could prove invaluable in the near future. It does capture the state of our knowledge of breeding populations in Washington at present, and for that reason alone it is indispensable.

Bill Tweit

The Birds of Sonora, by Stephen M. Russell and Gale Monson. 1998. University of Arizona Press, Tucson. 360 pages, 4 overview maps plus range maps for all species, 34 black-and-white illustrations by Ray Harm. Hardback, $75.00. ISBN 0-8165-1635-9.

The Birds of Sonora (hereafter *Sonora*) is an impressive work that covers the status and distribution of the avifauna of the Mexican state of Sonora, immediately south of Arizona. It provides an overview of the tranistion between temperate and tropical habitats on the Pacific slope of the Americas and will be of interest and value to all interested in North American bird distribution. Since 1964, the authors between them have spent 692 days in the field in Sonora, during 150 different trips that sampled almost all parts of the state. They summarized previous published work and made an effort to gather and assess unpublished museum data and field observations from numerous sources. Consequently, this work is a worthy successor to A. J. van Rossem's 1945 classic, *Birds of Sonora* (Occas. Papers Mus. Zool. Louisiana State Univ. 21), long out of print.

A short introduction provides an overview of the state's geography and habitats, brief discussions of migration, human effects on the environment (sadly, all too rampant), recent changes in bird distribution, and an explanation of the species accounts. Accounts for 525 bird species recorded from mainland Sonora constitute the meat of the book. One appendix lists plants mentioned, another is a comprehensive gazetteer. Islands in the Gulf of California are not included, and I did not find a cut-off date for inclusion of species or records (mid 1990s?). Sequence and taxonomy follow the AOU (through 1995, with notes in relation to the 1997 AOU supplement), and Spanish names are given for all species (following the new standard reference, Escalante et al. 1996). Decorative black-and-white illustrations of selected species are scattered through the text.

The "plan of the species accounts" section discusses problems with sight records, how relative abundances are defined, and what the maps show. Species of hypothetical occurrence are included in the body of the main text, within brackets, if their occurrence is "not supported by a specimen, a clearly diagnostic photograph, or extensive detailed information from multiple observers." These criteria appear to have been applied with borderline consistency; e.g., compare two sight records (two observers in all) of Sabine's Gull (hypothetical), with two records (three observers) of the Palm Warbler (accepted), or one record (three observers) of the Chestnut-sided (hypothetical). The authors note, however, that readers may wish to apply different criteria for judging records, and overall I applaud the extensive use of well-documented sight records in this work. It may also be noted that the authors were no less demanding of their own sight records, e.g., Monson's single-observer Prothonotary Warbler (hypothetical).

Symbols plotted on the maps show presumed breeding, confirmed breeding, transient, transient/winter, and locality records, this last when data are insufficient to determine a species' status at a given locality. Thus, at a glance, one can see the distribution and status of a given species, and reference to the text fills in details about seasonal occurrence, habitat, nesting behavior (e.g., the first published description of a nest of the Gray-collared Becard), and many other useful tidbits gleaned from the authors' and other observers' field experience. The easy writing style of the species accounts is a pleasant change from the impersonal, castrated text that pervades so much modern scientific writing, and the information is thus very accessible to both layperson and scientist; check the accounts for the Canyon Wren or Brown-backed Solitaire for two examples among many.

Subspecies are mentioned rarely, except for an eclectic selection of some well-marked races, e.g., the Savannah Sparrow but not the Fox, the Dark-eyed Junco but not the Solitary Vireo. Thus, readers interested in subspecies and their distributions, which provide interesting biogeographic insights, still need to consult Van Rossem

(1945). Listing subspecies and their distributions would have increased the value of *Sonora* greatly, although I recognize that this undertaking is far easier said than done.

More synthesis of information on topics such as local and elevational migrations or breeding seasons also would have increased the usefulness of *Sonora*. Simple lists of the avifauna by bioregion and by status (resident breeder, summer resident, transient, etc.) could have served to highlight gaps in our knowledge, perhaps prompting future studies.

The book has an attractive layout that may suggest another University of Arizona Press classic, *The Birds of Arizona* by Allan Phillips, Joe Marshall, and Monson (1964). *Sonora* is large (almost 9 × 12 inches) and library oriented, with liberal use of page space. While this may be a designer's dream, the same information could have been conveyed easily in a work half the size (and half the price!), and I would prefer a more compact and affordable book that could be carried easily in the field, where it would be invaluable. Instead, the book looks so "nice" that I suspect many will be reluctant to carry it even in the car! Typographical errors seem rare but not absent; e.g., the text lists four records of the Long-eared Owl while the map plots five.

These points notwithstanding, I recommend strongly *The Birds of Sonora* as an important addition to our knowledge of the status, distribution, and natural history of Mexican birds, and I look forward to the day when similar works exist for many more Mexican states.

Steve N. G. Howell

Parrots: A Guide to Parrots of the World, by Tony Juniper and Mike Parr. 1998. Yale Univ. Press, New Haven, CT. 584 pp., 88 color plates, numerous black-and-white drawings, about 350 maps. Hardback, $55.00. ISBN 0-300-07453-0.

This volume in the "Helm" series (published in the U.K. by Pica Press) might seem of little direct relevance to North American field ornithology, but bear in mind that 63 species of parrot have been recorded free-flying in Florida (Stevenson and Anderson, 1994, *The Birdlife of Florida*), 33 in California (Garrett, 1997, W. Birds 28:181–195). A few species maintain large populations in California, south Florida, and southernmost Texas, and 17 species occur naturally in Mexico north of the isthmus. Although parrot identification is well treated in many regional field guides, we find ourselves in a unique situation in the United States. Free-flying parrots and established naturalized populations might be derived from any of five continents; therefore regional guides do not treat all our species or give appropriate comparisons. Juniper and Parr provide the sort of guide that U. S. parrot-watchers have needed. At 7 × 9.75 inches it is hefty but microscopic in comparison to the other comprehensive treatment of the world's parrots, *Parrots of the World* by Forshaw and Cooper. Other advantages over Forshaw's monograph (1989) include a database that is several years more up to date, a substantially lower price, and greater emphasis on field identification, with more plumage variations shown. Portability and affordability are also advantages over the *Handbook of the Birds of the World*, vol. 4 (del Hoyo et al., 1997), which has a thorough and beautifully illustrated treatment of parrots.

The familiar format of this series needs little elaboration. *Parrots* has a slim introductory section, nearly half of which is devoted to conservation issues, befitting this beleaguered group and reflecting the impressive conservation credentials of the two authors. There are also four pages on systematics, five on natural history, and three describing the layout of the species accounts and parrot topography. The species accounts include sections on identification (a brief description and discussion of similar species), voice, distribution and status (conservation issues are treated in this section, underscoring the double threats parrots face from habitat degradation and trapping for the pet trade), ecology (with notes on habitat, foraging ecology, behavior,

and reproductive biology), detailed description, sex/age, measurements (ranges only, mainly from Forshaw, with sexes pooled and no sample size given), geographical variation (and often additional notes on taxonomic status), and references (listed at the end of each account, without specific citations within the text). A range map for each species thankfully shows national boundaries. English names used for parrots are maddeningly inconsistent, often reflecting a schism between scientific systematic works and the avicultural literature. Juniper and Parr's names do not accord with those of the AOU (for example, they use "Green-cheeked Amazon" for *Amazona viridigenalis*, which the AOU calls the "Red-crowned Parrot"), and the authors do not cite the authorities followed for their English names. The 88 plates were painted by five artists and vary greatly in quality, from quite good (especially those by Kim Franklin, who painted nearly half the plates) to some that are rather poor and obviously painted without reference to museum specimens.

I was disappointed that the introductory sections lack a diagnosis of the various groups (e.g., genera), summarizing their common field characteristics. Nowhere, for example, is there a discussion of flight differences among such genera as *Aratinga*, *Pyrrhura*, and *Brotogeris*, even though some text accounts within those genera accurately describe flight. In Los Angeles, where both *Aratinga* and *Brotogeris* are common, the latter is easily picked out by the frequent brief closing of its wings, as opposed to the more continuous wing-beating of *Aratinga*. *Parrots* does not describe this; instead, the flight of the Canary-winged Parakeet (*Brotogeris versicolurus sensu lato*) is called an unhelpful "swift and direct." One can get the gist of the flight appearance of *Amazona* from many species accounts, but there is no general statement about this group's distinctive rapid shallow wingbeats on bowed wings that are not lifted above the horizontal. On this subject Whitney (1996, Cotinga 5:32–42) is more useful because of that author's generic approach.

The maps are often at odds with the range descriptions in the text; in most cases it is the maps that are inaccurate. The map for Military Macaw (*Ara militaris*) in Mexico incorrectly shows a distribution largely confined to the central plateau, and the Barred Parakeet (*Bolborhynchus lineola*) and "Yellow-cheeked Amazon" (= Red-lored Parrot, *Amazona autumnalis*) are shown as occurring north to the Texas border! Distributional information for naturalized populations in the United States is incomplete, though much of this can be forgiven as we still struggle to determine which populations are well established. The authors consider the Red-crowned Parrot a "winter visitor in Brownsville, extreme south-western Texas, USA." Brownsville's hardly being in southwestern Texas aside, these birds are common year-round residents in several south Texas urban areas; although the possibility of natural establishment cannot be ruled out, it is odd that the natural provenance of these birds was not even questioned.

Allopatric species such as the Red-crowned and Lilac-crowned (*A. finschi*) parrots are often compared, which is useful to aviculturalists and those who live in the "outdoor aviaries" of the southern United States. However, these discussions are sometimes rather superficial; for example, there is no mention of the differences in tail shape and pattern, cere color, and voice distinguishing these two parrots. The differences between the White-winged (*Brotogeris versicolurus sensu stricto*) and Yellow-chevroned (*B. chiriri*) parakeets (now split by the AOU) are poorly treated in the combined Canary-winged Parakeet account. The color plate doesn't help matters—it is among the worst in the book. The distinctive body colors are reversed (the Yellow-chevroned should be the more yellow-green), bill colors are incorrect, the greater primary coverts are shown as yellow (they are mainly green in both species), and all figures are "anatomically challenged," to say the least, in their folded secondaries and greater secondary coverts, as well as the number of primaries. Anatomical oddities extend to the parrotlets and some lorikeets and macaws, but many difficult groups (such as the *Pyrrhura* parakeets) appear to be handled well.

Parrots brings together more identification information in a single volume than has previously been available for this fascinating group. It will be especially useful to those who travel to parrot-rich regions currently lacking good field guides (e.g., much of South America), as well as those who live in parts of California, Florida, and Texas. The book's shortcomings presumably reflect a haste to bring it into print in the competitive world of identification guides; many could have been rectified by stronger regional review and greater use of museum specimens by some of the artists. North Americans who are not parrot aficionados and do not plan to travel to areas of high parrot diversity should be aware that the identification of naturalized parrot populations in North America will be made easier by greatly expanded coverage in the 3rd edition of the National Geographic Society field guide and in David Sibley's forthcoming North American identification guide.

Kimball L. Garrett

Shrikes: A Guide to the Shrikes of the World, by Norbert Lefranc, illustrated by Tim Worfolk. 1997. Yale Univ. Press, New Haven, CT. 192 pages, 16 color plates, 75 black-and-white figures. Hardback, $35.00. ISBN 0-300-07336-4.

Shrikes follows the familiar format of the Pica/Yale family guides, with brief introductory sections (discussing taxonomy and an overview of genera covered), color plates with short facing-page texts, and species accounts (which include range maps). Despite its title, this book covers only 31 of the world's 75+ shrike species (the principal omission is the bush-shrikes, subfamily Malaconotinae). The author suggests that the three genera covered (*Lanius, Corvinella, Eurocephalus*) are the "true shrikes," but this classification, based on DNA-hybridization studies, is rather weak, and this book cannot claim to be a comprehensive monograph of the shrikes.

In general, the text is informative, but there is less emphasis on identification than most readers would probably expect, and I found the taxonomic approach frustratingly inconsistent. One recently proposed split is followed, the separation of the Southern Gray Shrike (*L. meridionalis*) from the Great Grey (= Northern) Shrike (*L. excubitor*), while the Red-tailed Shrike (*L. phoenicuroides*) is left within *isabellinus*, despite published evidence for its specific status (partly from the same researcher who suggested the *meridionalis* split!), evidence that even Lefranc admits should "be taken seriously" (p. 14). For the subspecific taxonomy of the Northern Shrike, only weak justification is given for ignoring the conclusion of Phillips (1986; *The Known Birds of North and Middle America*, part 1) that *invictus* should be synonymized with *borealis*, suggesting the author may not appreciate variation in nearctic populations. While the Northern Shrike of North America shows affinities with the eastern palearctic *sibiricus*, the text stresses similarities, omits some significant differences (e.g., the pattern of the outer rectrix), and makes no mention of the possibility that the Northern Shrike may be a distinct species (as has been suggested recently for a number of trans-Beringian avian taxa).

The plates are good if somewhat "flat," but too few non-adult plumages are illustrated, especially where they would be most valuable for identification (e.g., in the *cristatus–collurio–isabellinus* complex). The distribution maps are excellent for palearctic taxa but markedly less detailed for afrotropical species and the Loggerhead Shrike.

This book partially fills an obvious niche in the ornithological literature and will be required reading for shrike enthusiasts, but it does little to dispel suspicion that many avian monographs are increasingly Eurocentric and of decreasing value in terms of species (and content) per dollar.

Jon R. King

Nightjars: A Guide to Nightjars and Related Nightbirds, by Nigel Cleere, illustrated by Dave Nurney. 1998. Yale Univ. Press, New Haven, CT. 317 pages, 36 color plates, numerous line drawings, 123 maps, 2 tables. Hardback, $40.00. ISBN 0-300-07457-3. The CD **A Sound Guide to Nightjars and Related Nightbirds** (not reviewed here), compiled by Richard Ranft, is available separately for $20.00, ISBN 0-300-07457-3.

Why should you buy a guide that you'll probably never carry in the field, for a group of birds that you hardly ever see? The author's stated purpose was to put under one roof illustrations of all the nightjars and their relatives (many painted for the first time), and to summarize "much of what is currently known about these fascinating birds." There is no previous compendium about these birds. Thus, this is not just another book about nightjars, it's *the* book about nightjars.

I examined this book with several thoughts in mind: How does it compare to other worldwide monographs written by a British/European author? How does it stand up as an introduction to a charismatic but difficult-to-observe group of birds? How well does it work in North America?

Several earlier worldwide guides have been broadly criticized for their decidedly Eurocentric bias. Seemingly written in a vacuum, neither text nor illustrations demonstrated much familiarity with the biology or field characteristics of New World species. To their credit, the author and illustrator of *Nightjars* augmented a rigorous literature search with a significant effort to contact ornithologists in the Americas. The list of persons who provided information, recordings, or photos is rich in New World contacts. Still, some with decades of field experience in Latin America are not mentioned, and this may account for some inconsistencies. For example, the Great and Northern potoos, both of which can be quite common, are considered rare to uncommon. Some of the earlier guides were criticized for being woefully devoid of documentation in the text. The introductory chapters of *Nightjars* are liberally peppered with citations, and in the species accounts, primary sources are listed at the end of each write-up.

The book follows a traditional classification, treating about 120 species in five families (the Oilbird, frogmouths, potoos, owlet-nightjars, and nightjars), and stands up very well as considerably more than just an introduction to caprimulgiform families. Short introductory chapters cover taxonomy and relationships, distribution, topography and morphology, structure and mechanics, plumages and molt, behavior, and the fossil record. Each species account includes the sections we've come to expect, including identification and comparison with similar species, voice descriptions, habitat and habits, food, breeding behavior, measurements, distribution, status, etc.

The plates are uncrowded and reasonably attractive; they illustrate almost no variation in pose, but then neither do most nightjars. In all, 119 species are illustrated; two are probably extinct, and three are known only from single specimens. A line drawing in the text illustrates an additional species known only from a wing. The Oilbird, frogmouths, potoos, and owlet-nightjars are depicted on perches. All nightjars are illustrated both perched and in flight; for the latter, both male and female are generally shown. Only a few juveniles are illustrated. The 90 nightjars are gray, brown, or rufous and have evolved beautiful, intricately patterned plumage resembling dead leaves, tree bark, or sun-dappled soil. Nonetheless, Nurney succeeded admirably with the difficult task of making each bird look different. A minor objection with the illustrations: the nightjars were all painted with one wing tip angled upward, presumably to depict patterning in the primaries. Typically, most nightjars roost with the wings held flat over the tail.

How does the book work in North America? Perhaps not as well as one would hope. Some readers may be disappointed by coverage of the highly variable Common Nighthawk: only one of the seven races found north of Mexico is illustrated.

Identifying the Antillean Nighthawk does not suddenly become easier, and no habitat information for this popular south Florida target species is presented.

Distinguishing the Chuck-will's-widow from the Whip-poor-will is dealt with in the descriptions of each. However, distinguishing Stephen's (or Mexican) Whip-poor-will, the breeding form of the southwestern U.S., from the vocally different eastern birds will still be a problem unless the bird calls. Minor plumage differences are noted, but the undertail patterns are not illustrated, and I did not find the voice descriptions helpful. Listening to a recording will clarify the voice difference, although a sonogram would serve the purpose for most readers. Surprisingly, no sonograms appear in the text: these are useful learning tools for birds with rhythmic calls, and I consider their absence one of the text's great weaknesses. Many of the nightjars' scientific names have delightful meanings, and people are often interested in such translations; perhaps they will be included in the next edition.

I have spent a fair amount of time chasing and photographing nightjars and potoos. There are few groups of birds whose images or voices can so powerfully transport me to faraway places. Be warned: reading this book will not immerse you in the magic of a field experience; neither will it make these birds much easier for you to see. It will, however, provide you with much information that puts their largely hidden lives into some greater context. In that sense, it satisfies the author's goal, and for that reason you should buy it.

Robert A. Behrstock

FEATURED PHOTO

VARIATION IN IRIS COLOR OF FEMALE BREWER'S BLACKBIRDS

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The pale irides of the Rusty Blackbird (*Euphagus carolinus*) have often been cited as a useful feature distinguishing this species from the female Brewer's Blackbird (*E. cyanocephalus*). Recent scrutiny of the latter species in central California, however, has shown that females regularly show pale irides, often indistinguishable from those of the Rusty Blackbird. Paler-eyed female Brewer's Blackbirds have been noted for many years, from the west coast to at least Texas (J. Morlan pers. comm., Oberholser 1974), but they have rarely been discussed in print and have generally been considered rare or aberrant (Oberholser 1974, Hamilton 1995).

A first step in determining iris-color variation in female Brewer's Blackbirds is to distinguish these birds from young males. Prior to the first prebasic molt (July to September), juvenile Brewer's Blackbirds show (1) obvious pale, fleshy gapes, (2) shorter, paler bills than the adults, (3) evenly brown coloration throughout the wings and tail, and (4) loose-textured plumage, in the field visible primarily on the flanks (Pyle 1997, Jaramillo and Burke 1999). While it would be extremely rare for a male in full juvenal plumage to show entirely whitish or yellow eyes, irides in the range of pale brown to dark honey are not uncommon. The young male's pale eyes and blackish plumage typically begin to show by August; thus, brownish Brewer's Blackbirds showing pale eyes between fall and early summer are undoubtedly females, not young males.

The irides in Brewer's Blackbird are laden with white reflective organelles, which give them their pale color; in females, melanin granules on the surface of the iris mask the reflective granules, giving them largely dark eyes (Hudon and Muir 1996). It is variation in the amount of melanin pigment that creates the variation in females' eye color. To obtain a measure of the percentage of winter females that show pale irides, McKee observed 252 females in coastal San Mateo County, California, in January 1999. Of these, nine (4%) showed irides that appeared whitish or pale yellow in the field. At very close range, the irides some of these birds showed a small amount of dark flecking. Another 15 individuals (6%) had irides that contrasted with the darker pupil but were more heavily flecked with dark pigment; at a distance they generally appeared pale brown or honey-colored. The remaining 90% showed blackish or dark brown irides, not contrasting noticeably with the pupil. We have found several adult females in which one iris appeared much lighter than the other and noted that intermediate and darker irides often show a reddish cast in strong sunlight.

Pale-eyed female Brewer's Blackbirds may be a pitfall for the unwary, but an awareness of variation within Brewer's and Rusty blackbirds, as well as careful consideration of molt, wear, and structural features, should allow the identification of most individuals in the field—only heavily worn females in summer might readily be confused. McKee photographed the Brewer's Blackbird on the back cover at Andrew Molera State Park, Monterey County, California, on 11 October 1998. This bird's fresh-looking blackish wings indicate that it has recently undergone its prebasic molt; its extensively brown plumage show it to be a female. A Rusty Blackbird in October would show obvious rusty feather edges on the head, wings, tertials and back, pale-edged undertail coverts giving a "scalloped" look, a shorter tail, shorter legs, a more pointed and often deeper bill, and a more heavily patterned face with marked contrast between a pale supercilium and dark lores.

We thank Jon Dunn, Paul Lehman, Joseph Morlan and Ronald Thorn for sharing useful information on Brewer's Blackbirds. Thanks also to Jocelyn Hudon for his detailed descriptions of blackbird irides, and for his helpful review of the manuscript.

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HAWK WATCHING, BIRDING, AND OTHER FUN IN VERACRUZ, MEXICO

The amazing number of raptors migrating through the Mexican state of Veracruz (up to one million in a day!), combined with a large diversity of resident raptors, make this part of eastern Mexico a hawk-watcher's dream. With the help of Mexican ornithologists who have been monitoring raptors, WFO is sponsoring a trip this fall to Veracruz. If weather conditions are right we could see up to 500,000 or more individual raptors. We will visit varied coastal and inland habitats, including rain forest, that should produce around 260 to 320 species of birds, ranging from the Sungrebe and Boat-billed Heron to the Keel-billed Toucan and Collared Araçari to the Red Warbler and Dwarf Jay.

Besides birding, we will watch butterflies (many beautiful species identifiable with a unique field guide by southern California butterfly enthusiast Wanda Dameron) and other wildlife. We will visit a grand archeological museum, a botanical garden, and pre-Columbian ruins, as well as savor some of the history, culture, and wonderful food of Veracruz. Although the emphasis of this trip is birds, especially hawks, the trip is a sampler of the natural and cultural history of Veracruz, not a life-lister's marathon. The pace will sometimes be fast, but the walks are mostly easy with some hill climbing. Profits go to WFO and Pronatura, a Mexican conservation organization working toward a research center in Veracruz.

Schedule: Sunday 3 October (meet at the Veracruz airport at 2:30 PM, when the 1:40 Mexicana flight from Mexico City is scheduled to arrive) to 13 October (return to airport in time for 3:15 PM flight).

Leaders: Jim Royer, David Yee, and Pronatura ornithologists

Cost: $1700, payable with a deposit of $850 by 1 July and the remainder by 1 September 1999. This includes all food, accommodations, guides, entrance fees, boat trips, and transportation in air-conditioned vans. Air fare your point of origin to Veracruz excluded. Minimum 5 participants, maximum 12.

For more information and detailed preliminary itinerary contact Jim Royer (evening, 805-528-8933; jcadroyer@aol.com) or David Yee (209-365-1526; dyee@cwws.net).

WESTERN BIRDS

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Cover photo by © Keith C. Kwan of Sacramento, California: Bristle-thighed Curlew *(Numenius tahitiensis)*, Point Reyes National Seashore, California, May, 1998.

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WESTERN BIRDS

Volume 30, Number 3, 1999

THE BRISTLE-THIGHED CURLEW LANDFALL OF 1998: CLIMATIC FACTORS AND NOTES ON IDENTIFICATION

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The Bristle-thighed Curlew (*Numenius tahitiensis*) undertakes one of the longest known transoceanic migrations of any shorebird, commuting between its breeding range in western Alaska and its wintering grounds in the tropical Pacific. Its world population is likely less than 10,000 (Marks 1996), and its breeding population consists of approximately 3500 pairs (Gill and Redmond 1992). Prior to 1998, there were only four North American records of the Bristle-thighed Curlew south of Alaska, which is not surprising given the species' small numbers and expected migratory route.

During May 1998, however, between 13 and 17 Bristle-thighed Curlews were recorded on the Pacific coast between Point Reyes, California, and Tatoosh Island, Washington. Notably, vagrants of three other trans-Pacific migrants were also found along the same stretch of coast line that May, the Gray-tailed Tattler (*Heteroscelus brevipes*), Eurasian Whimbrel (*Numenius phaeopus variegatus* or *N. p. phaeopus*), and Bar-tailed Godwit (*Limosa lapponica*). At the same time, weather patterns over the North Pacific were strongly influenced by both the well-publicized 1997/1998 El Niño and a much less publicized but equally influential positive phase of the West Pacific Oscillation (WPO).

We hypothesize that, in general, the occurrence of a large number of long-distance transoceanic vagrants is related to extreme weather, whereas the occurrence of a single vagrant may be caused by a number of factors, including unusual weather, a defective internal compass (Berthold 1993), and ship assistance. Consequently, we examined wind and cloud patterns in the North Pacific to search for anomalies that might have contributed to the Bristle-thighed Curlew landfall. We also looked at broader climatic phenomena (El Niño and the WPO) for their part in any unusual conditions.

Evaluation of the May 1998 Bristle-thighed Curlew reports required a thorough understanding of this species' identification. Therefore, we reviewed previously published identification criteria and assessed these further by examining the specimens in the Burke Museum, University of Washington, Seattle.

METHODS

We located and assessed past records of the Bristle-thighed Curlew and other species by reviewing regional texts (see Literature Cited), reviewing *American Birds/Field Notes,* and contacting state and provincial bird records committees. Sightings from the 1998 invasion were first compiled by a review of Michael Patterson's Bristle-thighed Curlew World Wide Web page and from discussions with active birders. We assessed the reports by examining descriptions, photographs, and in one case, a wing of the bird involved. The photographs were gleaned mostly from Patterson's Web page, the descriptions were obtained from the observers, and the wing was inspected at the Burke Museum (UWBM 59322). We evaluated identification criteria for the Bristle-thighed Curlew by reviewing previously published analyses and photographs (Johnsgard 1981, Hayman et al. 1986, Paulson 1993, Rosair and Cottridge 1995, Higgins and Davies 1996), by studying specimens at the Burke Museum, and through discussion with observers familiar with this species (David James, Dennis Paulson, Peter Pyle, and Sievert Rohwer).

Kevin Aanerud and Mlodinow compared the eight full specimens and five spread wings of the Bristle-thighed Curlew with 39 full specimens and 25 spread wings of the Whimbrel, mostly *N. p. hudsonicus*, but including some *variegatus* from eastern Asia. Three of the Bristle-thigheds were in relatively fresh plumage, two from April and one from August. The remaining five whole specimens were somewhat worn adults collected in October. All Bristle-thighed wings were from fall. We measured thickness of tarsi 2 cm below the tibiotarsal joint.

Our estimates for the total number of Bristle-thighed Curlews making landfall south of Alaska were based on the number of birds seen, the amount of sandy beach habitat between Tatoosh Island and Point Reyes, and the extent to which this habitat that was surveyed. Linear miles of sandy beach habitat were estimated from geological maps for California, Oregon, and Washington. This habitat was denoted as Quaternary sand or Quaternary beach and dune sands on these maps. Estimates of the amount of this habitat searched were based on interviews with active birders. Estimates of total birds found were made on both most conservative and least conservative criteria. For the most conservative estimate, all sightings within a 12-day period and a 10-mile radius were considered to be of the same individual(s). The 12-day period was based on the stay of the birds at the south jetty of the Columbia River, the longest we know of. The least conservative estimate supposed that all nonconsecutive sightings at least 1 mile apart were of different individuals.

We arrived at the most conservative estimate of total curlews involved in the 1998 event by expanding the most conservative estimate of birds by the most conservative estimate of sandy beach habitat surveyed. Similarly, we derived the least conservative estimate by expanding the least conservative

estimate of birds by the least conservative estimate of habitat. We did not extrapolate beyond the northern and southern edges of the observed area of the curlew's occurrence.

The monthly average WPO index and the Southern Oscillation index (SOI) were both made available by the National Oceanic and Atmospheric Administration (NOAA)/Climate Prediction Center in Washington, D. C. These indices are expressed by a positive or negative number that measures the strength of the WPO and El Niño/Southern Oscillation, respectively. To search for anomalous winds between 15 April and 15 May 1998, we used daily averaged data from the National Centers for Environmental Prediction/National Center for Atmospheric Research Reanalysis (Kalnay et al. 1996), which were obtained from the NOAA Climate Diagnostics Center in Boulder, Colorado.

We calculated model trajectories to estimate the path taken by the migrating Bristle-thighed Curlews, using the winds at the 600-mb pressure level. This level, which approximately corresponds to an altitude of 4 km above sea level, is selected because that is the typical elevation for shorebirds migrating over water (Richardson 1976, Williams et al. 1977, Elkins 1988, Kerlinger and Moore 1989, Berthold 1996). We calculated the trajectories for six consecutive days beginning 26 April 1998. The initial location of the curlews is specified as the southernmost end of the 20 m/s northerly wind contour (the dashed contours in Figure 2) in the north-central North Pacific. We then assumed that the curlews flew parallel to the local wind vector, i.e., drifted downwind, at an air speed of 25 m/s (similar general conclusions are obtained with other realistic air speeds). Mathematically, this can be written as

$$\mathbf{V} = \mathbf{V}_w + a\mathbf{r},$$

where the vector $\mathbf{V}$ is the bird's ground speed, $\mathbf{V}_w$ is the observed wind vector, a = 25 m/s (the bird's air speed, Marks and Redmond 1994a), and $\mathbf{r}$ is a unit vector parallel to $\mathbf{V}_w$. The equations for the longitudinal and latitudinal displacement of a bird undergoing downwind drift are

$$dx = U(t)dt;\ dy = V(t)dt,$$

where dx is the eastward displacement and dy is the northward displacement of a bird moving with an eastward ground speed at time t of $U(t)$ and a northward ground speed at time t of $V(t)$ over a time interval dt. The appropriate spherical representations are used for dx and dy (see Holton 1992), and the time step dt is specified as one hour. With this approach, the temporal changes to the observed wind pattern throughout downwind drift are taken into account. Also, temporal and spatial mathematical linear interpolation is performed as the observed wind vectors are obtained from NOAA Climate Diagnostics Center as daily averages on a 2.5° latitude/longitude grid.

RESULTS AND DISCUSSION

Status and Distribution

Bristle-thighed Curlews are known to breed only in Alaska, where they have been found in the Nulato Hills (the low mountainous region just north and east of the lower Yukon River) and across the northern half of the

Seward Peninsula (Handel and Dau 1988, Kessel 1989). They typically arrive at their breeding grounds in mid-May but have been found there as early as 5 May (Kessel 1989); a record from Attu Island on 2 June 1993 (AB 47:444) was likely of a late northbound migrant. After nesting, much of the population stages in Alaska's Yukon–Kuskokwim delta before migrating south, with smaller numbers staging along the Seward Peninsula coast (Handel and Dau 1988, Kessel 1989). The first southbound adults appear at these staging areas as early as late June. A larger influx of adults occurs in late July, followed by adults with juveniles in early August (Handel and Dau 1988). By mid-to-late August most adults and juveniles are gone. The latest date from Alaska is 18 October 1994 on St. Lawrence Island (FN 49:85). In both the upland breeding areas and the coastal staging areas, dwarf shrub habitat is preferred (Kessel 1989).

Little is known of Bristle-thighed Curlews during migration. The first possible stop for southbound birds is the northwestern Hawaiian Islands, some 4000 km away. These islands serve as the wintering ground for 700 to 800 individuals, but few if any passage migrants stop there during either fall or spring (Marks and Redmond 1994a,b). Consequently, those curlews wintering farther south in the Pacific likely travel at least 6000 km without resting during both fall and spring migration. Bristle-thighed Curlews have been known to migrate in the company of Pacific Golden-Plovers (*Pluvialis fulva*) (Marks and Redmond 1994a) but rarely associate with Whimbrels, even at mutual staging sites in Alaska (Handel and Dau 1988).

The Bristle-thighed Curlew winters commonly in the northwestern Hawaiian Islands, eastern Micronesia, and eastern Polynesia. It is less common in central Polynesia and Fiji and rare in the main Hawaiian Islands and western Micronesia (Pratt et al. 1987, Marks and Redmond 1994b). The bulk of the winter range is, therefore, between 135° W and 175° E. There are four records from farther south or east in the Pacific: two from the Kermadec Islands during September 1972 (Veitch 1974), one from Norfolk Island during January 1968 (Turbott 1990), and one from Easter Island (Vilina et al. 1992).

Bristle-thighed Curlews can be found year round on their wintering grounds but are most numerous between September and April (Gill and Redmond 1992). Birds remaining through the austral winter are largely immatures, which do not migrate back north until they are approximately 34 months old (Marks 1993, Marks and Redmond 1996). The favored winter habitats include open dry grasslands, saltpans, edges of tidal channels, and sandy beaches (Pratt et al. 1987, Gill and Redmond 1992), but some birds also venture into brushland and open woodlands (P. Pyle pers. comm.).

On the northwestern Hawaiian Islands, returning adults arrive from mid-July to late August, juveniles mostly between mid-August and early September (Marks and Redmond 1994a), though some appear as late as early October (P. Pyle pers. comm.). Spring departures occur almost entirely during very late April and early May (Marks and Redmond 1994a, P. Pyle pers. comm.). Bristle-thighed Curlews wintering in Hawaii mostly inhabit open dry grasslands but congregate on sandy beaches, mudflats, airplane runways, and similar areas just after fall migration and just prior to spring migration (J. Marks, P. Pyle pers. comm.).

On the main Hawaiian Islands, Bristle-thighed Curlews are quite scarce. Historically, only one or two birds were seen, usually between late August and early October, and usually near Kahuku, Oahu (R. Pyle pers. comm.). Starting about 1990, individuals began wintering, and the numbers during fall increased. During the winter of 1997–98, there were at least 13 birds at Kahuku, and, for the first time, a few may be summering (R. Pyle pers. comm.).

Records Prior to 1998

Prior to 1998, there were only four accepted records of the Bristle-thighed Curlew from North America outside of Alaska. The first of these is of a bird collected at Grant Bay at the northwestern end of Vancouver Island, British Columbia, on 31 May 1969 (Richardson 1970). The second is of two photographed at Bandon, Oregon, on 16 September 1981 (Gilligan et al. 1994). The third is of one seen at Leadbetter Point, Washington, on 1 May 1982 (Widrig 1983), and the fourth was recorded at Blackie Spit along Boundary Bay, British Columbia, 13–14 May 1983 (Campbell et al. 1990).

Several birds reported and published as Bristle-thighed Curlews were later rejected by local authorities. One photographed at Cox Bay, near Tofino, along the western shore of Vancouver Island on 1 September 1982 was initially identified as a Bristle-thighed (AB 37:904), but later evaluation of the photograph suggests that it may well have been a Whimbrel (Campbell et al. 1990, D. Paulson, pers. comm.). A report from Victoria, British Columbia, on 11 September 1986 is considered hypothetical (K. Taylor pers. comm.). Widrig (1983) referred to two Bristle-thighed Curlews seen flying past Leadbetter Point on 18 May 1980—two years prior to his sighting. Unfortunately, the description of these birds, seen only in flight, is very brief, and the report must be left as hypothetical.

Notably, records of vagrants in Asia are also quite unusual and are apparently limited to Japan. Brazil (1991) listed 13 Japanese records, few with actual dates. Multiple records have come from May and September, with single records from March and July.

Records from 1998

The 1998 Bristle-thighed Curlew invasion started quietly on 6 May when David Lauten and Kathy Castelein tentatively announced a Bristle-thighed Curlew at Floras Lake, Curry County, Oregon. Regional birders' interest grew dramatically when two more were seen on 8 May flying past Ocean Shores, Grays Harbor, Washington (R. Sundstrom, H. Opperman pers. comm.). The ensuing three weeks led to 13 more reports that could have involved as many as 22 additional birds, giving a total of 15 reports consisting of up to 25 individuals (Appendix 1). Of these 15 reports, we found three (involving a total of eight birds) to be lacking details sufficient to be included in our analysis.

On the basis of the most and least conservative criteria under Methods, between 13 and 17 Bristle-thighed Curlews were seen, all between 6 and 25 May (*contra* Patterson 1998). Initial detection ranged from 6 May to 19 May, with a median of 13 May. All but two records came from sandy beaches, the birds at Tatoosh Island and Battery Point occurring on marine

terraces (Tertiary conglomerate). The discrepancy between the upper and lower estimates comes mostly from Ocean Shores/Westport, Grays Harbor County, Washington. At this location, one or two Bristle-thighed Curlews were reported only intermittently between 8 and 25 May, despite nearly continuous coverage, implying that several individuals or pairs may have passed through. The actual number of birds seen at Westport/Ocean Shores is somewhere between two and six, probably closer to six.

Between 40 and 65 miles of the 309 miles of beaches between Point Reyes and Tatoosh Island was surveyed by birders. Extrapolation by the most and least conservative methods leads to an estimate of 60 to 150 Bristle-thighed Curlews making landfall on the Pacific Coast of the contiguous United States. If the breeding population is roughly 3500 pairs (Gill and Redmond 1992), the 1998 invasion involved between 0.9 and 2.1% of breeding Bristle-thighed Curlews. If additional birds were lost at sea, an even greater proportion of the population was affected.

Parallel Vagrants

The Bristle-thighed Curlew is not the only shorebird that breeds in Beringia, winters on tropical Pacific islands, and is a vagrant along the coast of North America south of Alaska. Other such taxa are the Gray-tailed Tattler, Asiatic Whimbrel (*N. p. variegatus*), Bar-tailed Godwit, Red-necked Stint (*Calidris ruficollis*), and Sharp-tailed Sandpiper (*Calidris acuminata*). Of these, the Gray-tailed Tattler, Asiatic Whimbrel, and Bar-tailed Godwit were reported south of Alaska during May 1998 (Appendix 2)—the first time three of these species were reported during the same spring, an unprecedented event that seems likely related to the same weather factors that misplaced the Bristle-thighed Curlews. Surprisingly, Pacific Golden-Plovers did not occur in unusual numbers during the spring of 1998 (*contra* Patterson 1998), despite having a migratory route similar to that of the Bristle-thighed Curlew.

The Role of Weather

Given that Bristle-thighed Curlews migrate long distances over the open ocean and infrequently stray off course, one might presume that they have extraordinary navigational skills and are able to cope well with adverse weather. Williams and Williams (1990), however, suggested that transoceanic migrants do not have exceptional navigational skills. Current theory presents a picture of overwater migration of three stages: (1) when departing the tropics in spring, birds tend not to depart into strong headwinds—a trait of the Bristle-thighed Curlew (Marks and Redmond 1994a); (2) there is little or no compensation for lateral wind drift during overwater migration, with birds appearing to maintain a constant compass heading (Richardson 1976, 1991, Alerstam 1981, Williams and Williams 1988, Berthold 1996); (3) as birds approach their destination, they use additional navigational skills, such as compensating for wind drift and using landmarks (e.g., Williams et al. 1986).

There are three main causes of weather-related vagrancy among birds: strong head winds, strong lateral winds, and deep and horizontally extensive cloud cover. Unusually strong head winds rapidly deplete the fat reserves of migrant birds, particularly dangerous to those flying over the ocean. Exces-

sive lateral winds can cause overwater migrants to drift far off course, while deep clouds lead to a reduction in visibility that can lead to disorientation (Lack and Eastwood 1962, Able 1982a, Elkins 1988, Richardson 1990, Berthold 1993, Moss 1995). Both headwinds and heavy cloud cover can sometimes result in downwind orientation (Williamson 1959, Able 1982a,b, Able et al. 1982, Elkins 1988, Moss 1995), as this strategy increases the likelihood of reaching land.

El Niño and the West Pacific Oscillation

The occurrence of the Bristle-thighed Curlews coincided with both a large El Niño and a large positive phase of the WPO. The well-known El Niño phenomenon is characterized by anomalously warm surface water in the eastern equatorial Pacific Ocean and is accompanied by a strengthening of the westerly winds in the eastern subtropical Pacific. This change in the wind pattern can be seen by comparing the average 300-mb wind vectors off the west coast of Mexico from 15 April to 15 May 1998 (Figure 1a) to the 10-year average wind vectors for the same period (Figure 1b). (The 300-mb pressure level is about 8.5 km above sea level, well above the elevation of migrating shorebirds, as discussed earlier. However, we examine the 300-mb winds because midlatitude storm systems are to a large degree steered by the winds at this level.) The WPO, identified through the application of a rotated principal-component analysis (Barnston and Livezey 1987), involves changes to the wind pattern in the northwestern and north-central North Pacific. In the north-central North Pacific, where Bristle-thighed Curlew migration normally takes place, the positive phase of the WPO is characterized by a strengthening of the northerly component of the winds (compare Figures 1a and 1b).

The extraordinary circumstances of the spring of 1998 are determined by comparing the SOI and WPO indices with those of previous years. The SOI has been measured as far back as 1882, the WPO index to 1950. The SOI for April 1998 is tied with that for 1987 for the second most negative value since 1882 (a large negative SOI value denotes El Niño). The WPO index for the spring of 1998 had the second largest positive value during the past half century.

Wind Patterns

As noted above, shorebirds in general migrate over water at about the 600-mb level. Therefore, we searched dates between 15 April and 15 May 1998 for strong *anomalous northerly* or strong *anomalous westerly* winds (speeds at least two standard deviations greater than average) at 600 mb in the tropical and midlatitude North Pacific west of 140°W. Analyses at other pressure levels, from sea level to 250 mb, yielded essentially the same results as those at 600 mb. We confined the search to this region because it encompasses the Bristle-thighed Curlew's normal migratory route. For this analysis, we define the anomalous wind vectors as the difference between the observed vector wind field on a given day and the average vector wind field on the same calendar day, averaged from 1988 to 1998. We emphasize exceptional winds because curlews have presumably evolved to compensate for normal winds.

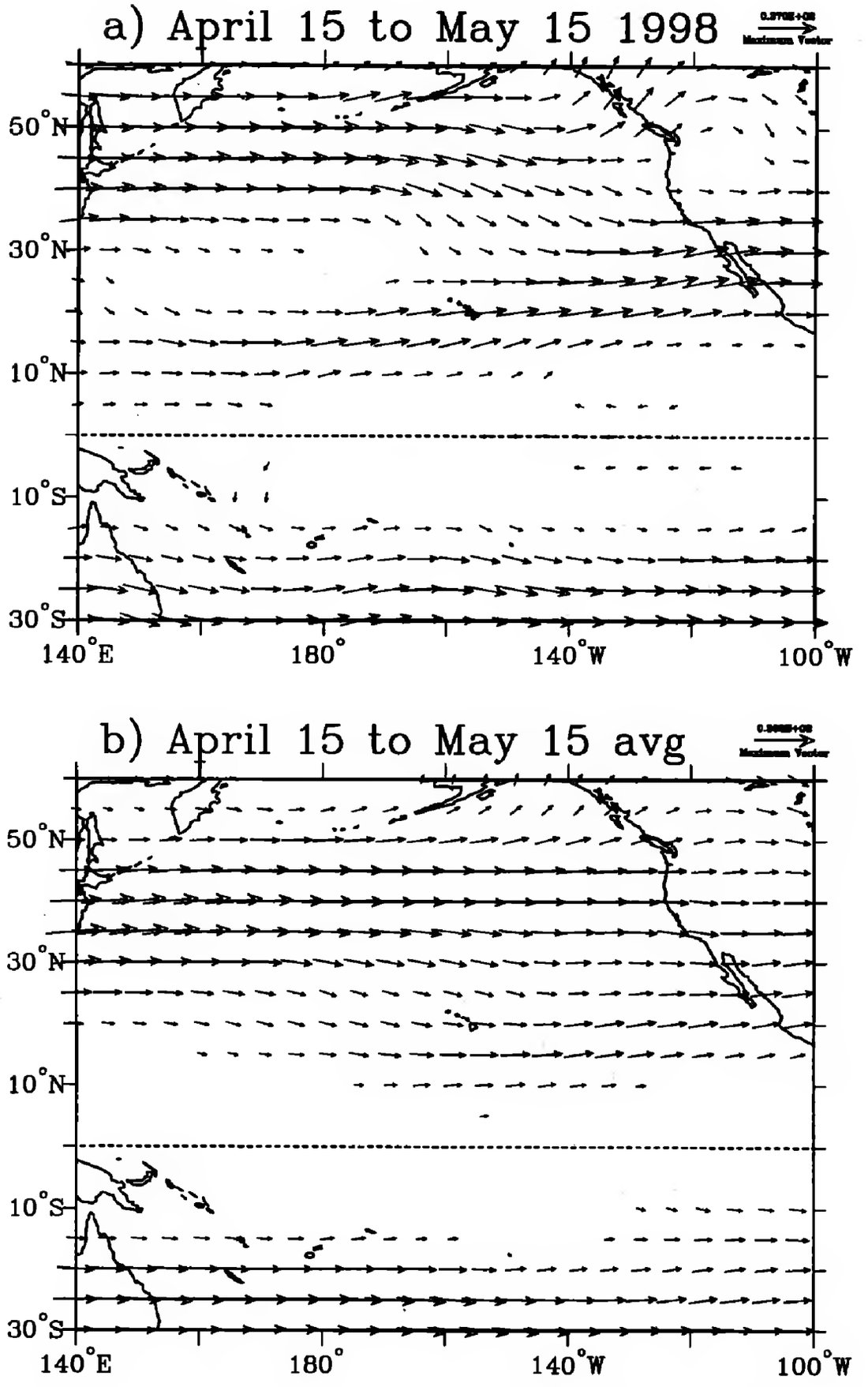


Figure 1. The 300-mb time-average wind vectors for (a) 15 April–15 May 1998; (b) 15 April–15 May 1988–1998. The maximum vector length, in units of m/s, is indicated at the top right corner of each frame.

We found anomalies of greater than two standard deviations only between 26 April and 2 May 1998. We illustrate the daily averaged winds on alternate days beginning on 25 April 1998 in Figure 2, which shows two regions of large anomalies, one between 30° and 50° N, the other between 5° and 15° S, both in the central Pacific. The former region involved both anomalous northerly and westerly winds, the latter just anomalous westerly winds.

At 40°N, 160° W on 25 April 1998, there was a weak trough (note that the winds rotate counter clockwise in a trough) that rapidly deepened (extending far to the south) over the following four days. This trough deepening, which is very unusual, is consistent with the influence of the positive phase of the WPO, with its anomalous northerly winds between 25° and 50° N and between 170° and 130° W (compare Figures 1a and 1b). Such anomalous winds correspond to an enhancement of the so-called stretching deformation field (Dutton 1995), which results in troughs being "stretched" southward and leading to substantial trough deepening (Lee 1995, Whitaker and Dole 1995; Figure 2). Coinciding with this trough deepening is a strengthening of northerly winds, reinforced by the positive phase of the WPO. Further amplification of this trough was likely due to a weak cyclone (denoted by an X in Fig. 2) at the ocean surface on 27 April 1998. The location of this cyclone, east of the 600-mb trough, was appropriate for a mutual interaction with the trough, resulting in a rapidly amplifying storm and stronger winds at all levels via baroclinic growth (Hoskins et al. 1985, Holton 1992). In the other region of interest, the tropical Southern Hemisphere, analyses at various pressure levels (not shown) revealed an extension of anomalous westerlies down to sea level but a decline in the amplitude of the anomalies at higher levels. Such characteristics are consistent with westerly wind bursts (e.g., Kiladis et al. 1994).

If the northerly headwinds were sufficiently strong, they could have depleted a curlew's energy reserves before it reached Alaska. Furthermore, these headwinds covered a longitudinal range broad enough that they could have affected birds heading north from anywhere in the species' winter range. For westerly winds, anomalous, not total, winds are relevant, because Bristle-thighed Curlews have presumably evolved to compensate for lateral drift by the average wind. The solid contours in the central Pacific in Figure 2 indicate that the anomalous westerly winds in both hemispheres could have also caused lateral wind drift, particularly for birds wintering in eastern Polynesia.

We first considered the influences of the anomalous westerly winds in the Southern Hemisphere, whose maximum speed was approximately 15 m/s (Figure 2c). If migrating curlews in this region are flying due north at an air speed of 25 m/s and encounter anomalous crosswinds of 10 m/s over 10 degrees latitude, they will drift eastward by a distance of approximately 4 degrees longitude. Clearly, this amount of eastward drift could not, by itself, account for the Bristle-thighed Curlew landfall. However, it may have contributed to the landfall indirectly if this drift was sufficient to lead the birds into the strong headwinds in the North Pacific.

The anomalous westerlies in the Northern Hemisphere, just to the south of the surface cyclone, were stronger than those in the Southern Hemi-

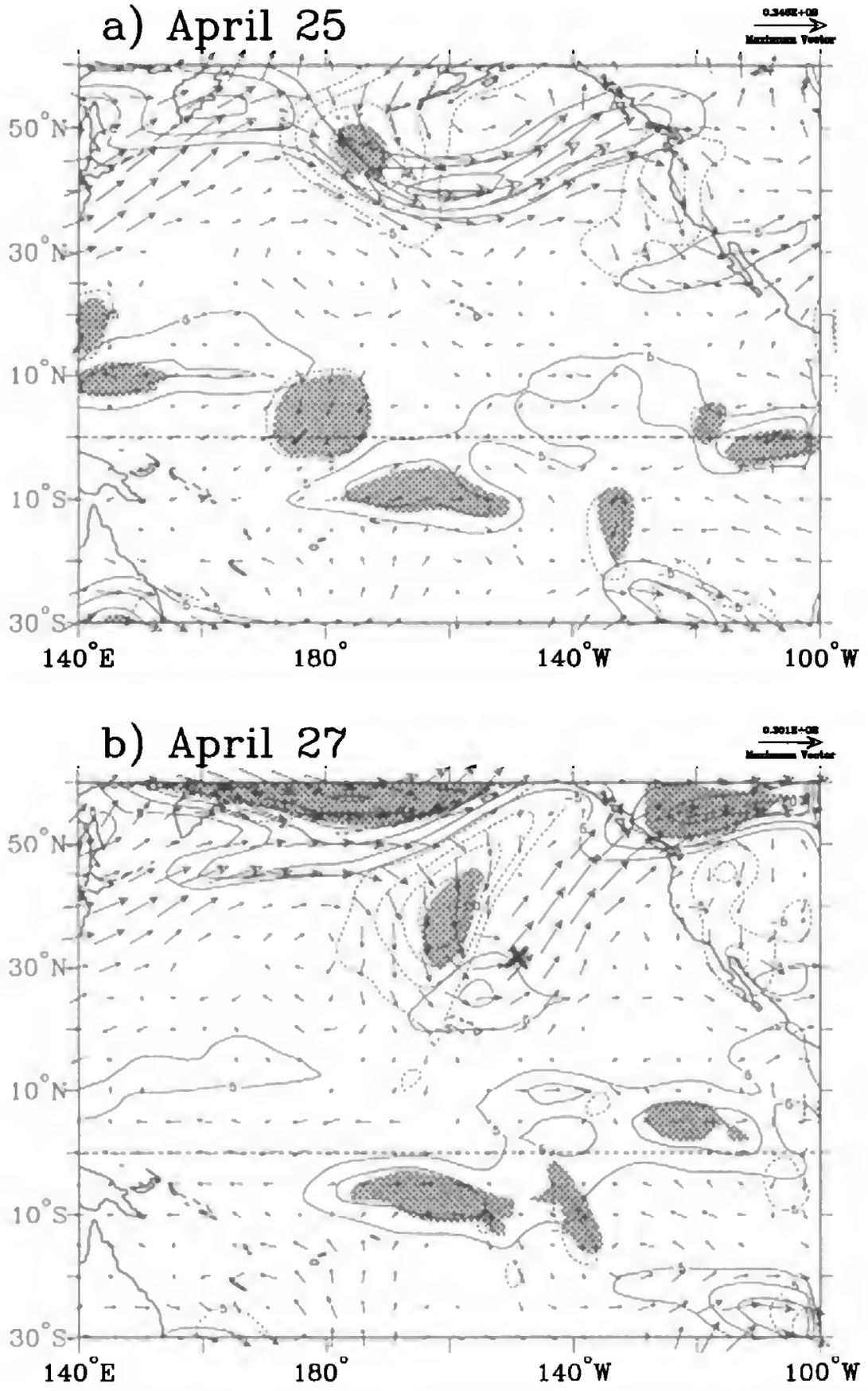
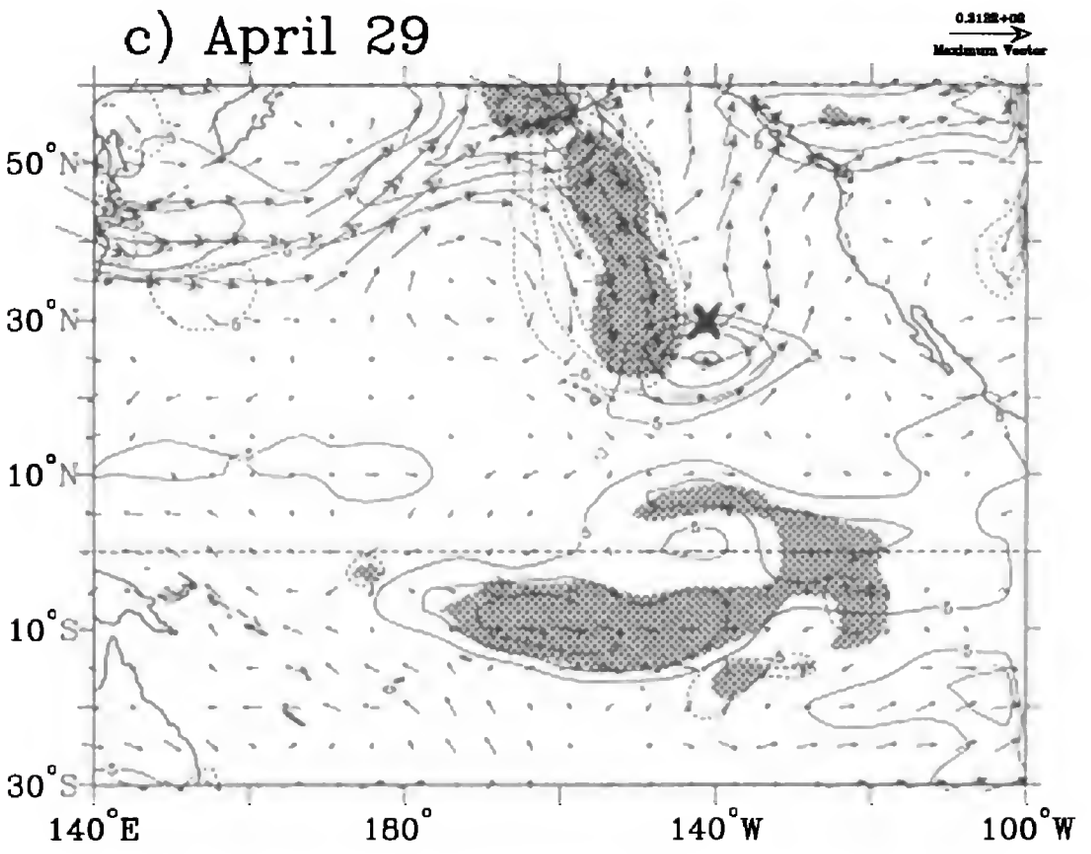
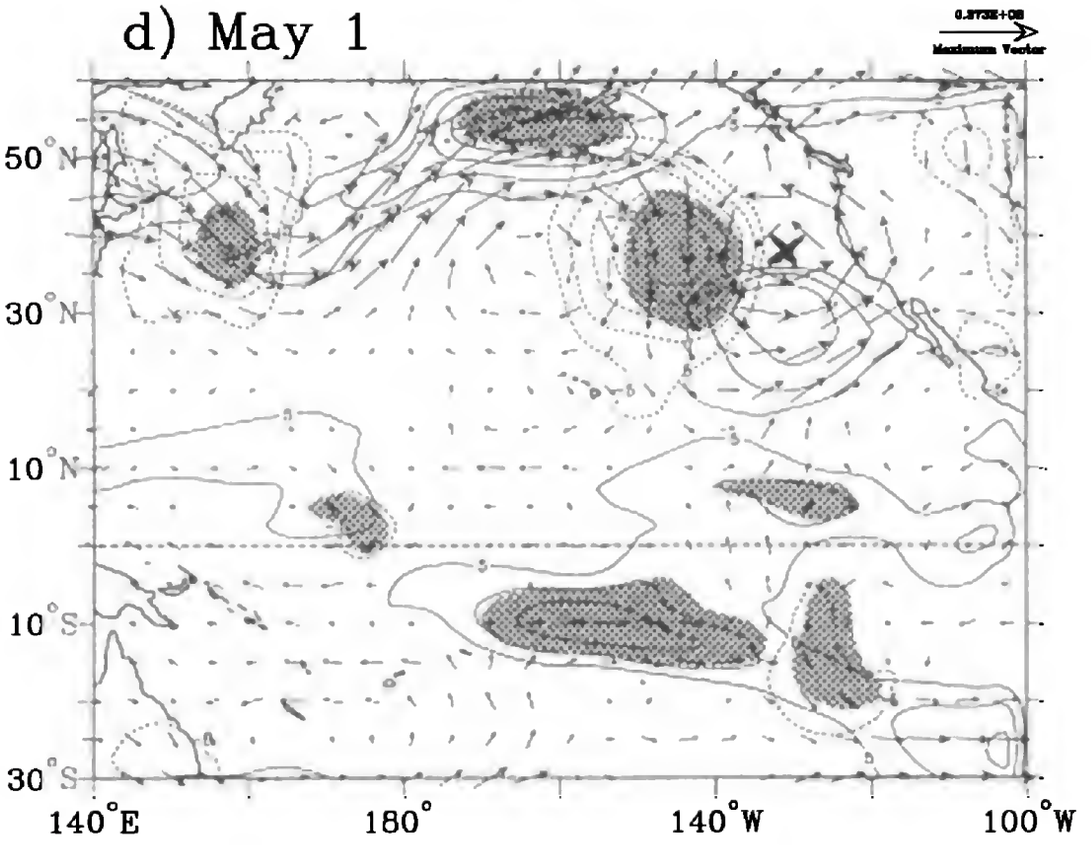


Figure 2. Total 600-mb wind vectors for (a) 25 April 1998, (b) 27 April 1998, (c) 29 April 1998, (d) 1 May 1998. Solid contours, anomalous westerly winds; dashed contours, anomalous northerly winds. The contour interval is 5 m/s. Shading indicates those regions where the anomaly exceeds two standard deviations, and the "X" denotes the location of the surface low. The maximum vector length, in units of m/s, is indicated at the top right corner of each frame.


c) April 29
50°N
30°N
10°N
10°S
30°S
140°E
180°
140°W
100°W


d) May 1
50°N
30°N
10°N
10°S
30°S
140°E
180°
140°W
100°W

sphere. If we assume an average anomalous crosswind of 15 m/s over 10 degrees latitude, the eastward drift would be 6 degrees longitude, again, insufficient to account for the 1998 landfall.

On the other hand, an examination of the northerly winds in the North Pacific quickly reveals that they were sufficiently strong to be a major impediment to any northbound Bristle-thighed Curlew. The maximum northerly wind speed in this region was in excess of 25 m/s, about the airspeed of a migrating curlew. Thus, birds flying into this wind would have made little headway and might have even been pushed backward. Since these strong headwinds spanned as much as 20 degrees of latitude, the birds likely depleted their fat reserves for little gain. To try to avoid these adverse headwinds, the migrating curlews could have dropped to a lower altitude, a response known in other species (see references in Richardson 1990). In this case, however, such an adjustment would have been of limited benefit. For example, at 850 mb (approximately 1.5 km above sea level), the strongest headwinds (not shown) were still in excess of 20 m/s, and at the surface, the maximum headwinds (not shown) varied between 10 and 15 m/s. Furthermore, a reduction in flight elevation to well below 850 mb would have been an unattractive alternative, obliging the birds to fly through a fairly extensive cloud cover (see below), which can seriously impair a bird's ability to orient correctly (Richardson 1990). Therefore, the Bristle-thighed Curlews could not have avoided the widespread anomalous northerlies in the North Pacific, and it is these winds more than the anomalous lateral winds that likely accounted for the curlew landfall.

Role of Clouds

As discussed earlier, extensive cloud cover can seriously disorient migrating birds. During the last few days of April 1998, there was fairly extensive cloud cover over much of the North Pacific. All of the cloud tops, however, were at a low elevation, except for high clouds several hundred kilometers from the storm center northeast of Hawaii (for example, see the infrared satellite image from National Climatic Data Center for 29 April at the World Wide Web site http://www.ncdc.noaa.gov/pub/data/goesbrowse/1998/g9ir29APR199800.jpg). Thus, except for any birds that might be inside the storm, curlews migrating at their usual altitude should have been well above the clouds, so cloud cover was unlikely to have played a significant role in the 1998 landfall.

Model Trajectory Calculations

As stated earlier, there is some evidence that migratory birds orient downwind when encountering strong headwinds. Indeed, when a bird is faced with headwinds sufficient to match its airspeed, flying downwind may be its only survival strategy. Therefore, we addressed the question of whether downwind drift could have brought the migrating Bristle-thighed Curlews to the west coast of the contiguous United States by means of a series of model trajectory calculations.

We calculated model trajectories for the 600-mb pressure level, one for each of the seven consecutive days beginning on 26 April 1998. Those for the first four days are shown in Figure 3. The trajectories for 30 April to 2

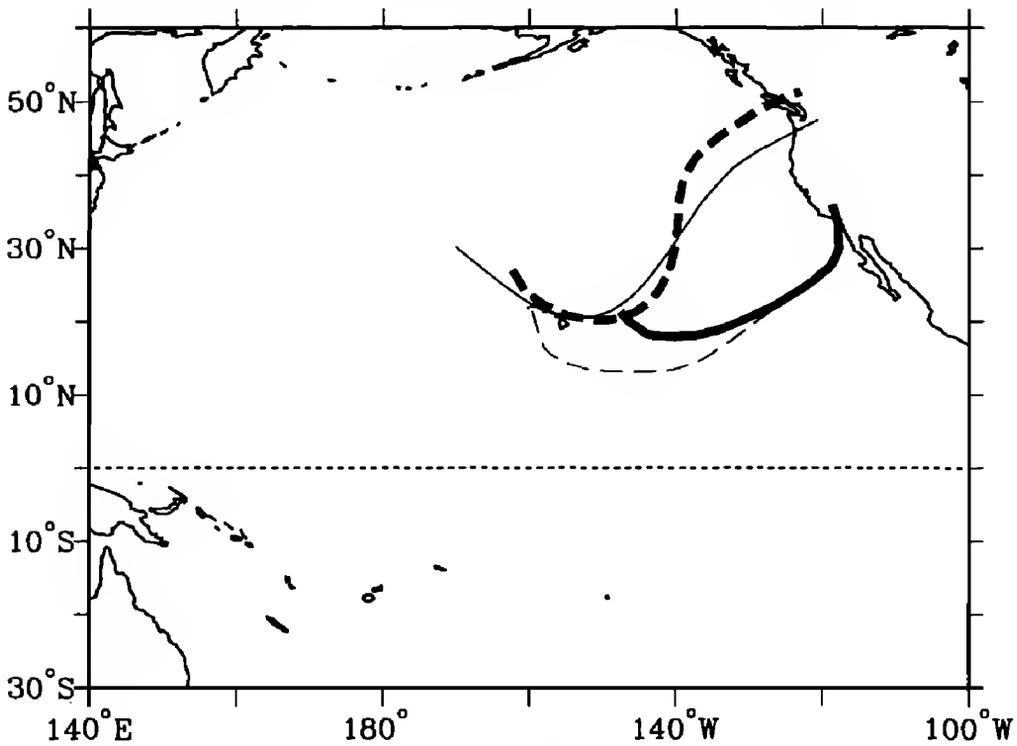


Figure 3. Model trajectories calculated for Bristle-thighed Curlews reorienting downwind in the face of insuperable headwinds. The thin solid curve corresponds to downwind drift beginning on 26 April 1998, the thick dashed curve to that beginning on 27 April 1998, the thin dashed to that beginning on 28 April 1998, and the thick solid curve to that beginning on 29 April 1998. The trajectory terminates when the theoretical bird reaches the North American west coast.

May 1998 are not shown because they predict that the curlews would have arrived in Baja California, inconsistent with actual observation. The trajectories' starting point is the western endpoint on the curves in Figure 3 and corresponds to the southernmost end of the 20 m/s northerly wind contour. These points, which correspond to the position of strongest headwinds at that latitude, represent possible locations where the curlews switched to flying downwind. The trajectories imply the birds reached the west coast between southern California and southern British Columbia, a pattern rather close to that observed. The models suggest that birds beginning downwind drift on 26 and 27 April 1998 flew to the Pacific Northwest, those starting downwind drift on 28 and 29 April 1998 to California. This southward shift in the arrival location for the latter two dates is explained by Figure 2, which shows that as the trough moved eastward, curlews undergoing downwind drift were increasingly under the influence of westerly rather that southerly winds. According to these calculations, the amount of time a bird took to reach land was 40, 36, 38, and 26 hours for the initial dates of 26, 27, 28, and 29 April 1998, respectively. During a typical year, curlews take between 25 and 37 hours to reach the Alaska coast from the starting point of the model trajectories. These results suggest that reaching the west coast of the U.S. was well within the curlews' capabilities.

According to our model, the curlews actually touched ground between 28 April and 1 May. The discrepancy between this prediction and field observations may be due to the species' rarity and the similarity to the Whimbrel.

Indeed, David Lauten (pers. comm.) almost wrote the first bird off as an odd Whimbrel. Furthermore, during the aftermath of the landfall several birders in central and northern California reported early May Bristle-thighed Curlews identified in retrospect, initially passed off as unusual Whimbrels (M. Rogers pers. comm.). Many of the birds were found in part because observers were actually looking for them and may not have been encountered or identified otherwise. Thus the lag between arrival and identification seems somewhat reasonable.

We also used the model trajectory to evaluate the contribution of El Niño to the downwind drift to the contiguous U.S. For this calculation, we used the observed wind pattern at 300 mb rather than that at 600 mb. This is because it is at the 300-mb level that El Niño has a strong influence; at 600 mb the effect of El Niño is substantially smaller (Pan and Oort 1983, Wang 1992). Thus if El Niño affected the migrating curlews, the birds would have had to move upward to a much higher elevation, an unlikely scenario. The results of this calculation, using the same four initial dates and locations as in Figure 3, bring the birds to the west coast of central and southern Mexico, far to the south of any observed curlews. Consequently, if strong headwinds followed by downwind drift accounted for the Bristle-thighed Curlew landfall, El Niño did not play a role.

Identification

The Bristle-thighed Curlew most closely resembles the Whimbrel, particularly the North American race *N. p. hudsonicus*. Characteristics considered useful have included bill shape and color, underpart color, chest markings, flank barring, undertail-covert barring, bristled thighs, upperpart coloration, rump pattern and color, tail pattern and color, under-primary pattern, underwing-covert color, leg shape, and call. We found some previously proposed distinctions to be lacking, while others were useful. In addition, apparently consistent differences in upper-primary pattern, underwing primary covert pattern, leg thickness, and behavior were uncovered by observers of the 1998 invasion or during our review of photographs and specimens. Of previously published discussions, we found Paulson (1993) to be the most accurate and informative, though the drawings in Hayman et al. (1986) and the photos in Rosair and Cottridge (1995) and Patterson (1998) are very useful.

Bill Color. When compared with the Whimbrel, the Bristle-thighed Curlew typically has more extensive pink-flesh color in the base of the bill, but there is much overlap in this mark, and its usefulness in the field is likely marginal (Paulson 1993). Also, the bill color of the Bristle-thighed Curlew varies with age, sex, and season. Females, winter adults, and immatures tend to have more extensively pale bills (J. Marks pers. comm.). On Laysan Island, during the spring of 1991, 70% of adult Bristle-thighed Curlews had attained completely black bills before migrating north, whereas less than 4% of subadults had done so (Marks 1995). Many of the spring 1998 vagrants had black or nearly black bills, but some had extensive pink.

Bill Shape. Differences in bill length, thickness, and curvature have been proposed, with the Bristle-thighed Curlew having the longer, thicker, and more decurved bill. These do not seem to hold up to the scrutiny of actual

measurement (Johnsgard 1981, Hayman et al. 1986, Higgins and Davies 1996, A. Jaramillo in litt.) and review of photographs.

Underpart Coloration. The Bristle-thighed Curlew is often reported to have more richly colored underparts than the Whimbrel. However, both *hudsonicus* and the Bristle-thighed Curlew can be rather orange-buff underneath (*variegatus* lacks these warm tones). While the brightest Bristle-thigheds are more colorful than the brightest adult or juvenile *hudsonicus*, some overlap does exist between juvenile *hudsonicus* and the adult Bristle-thighed, especially those in worn plumage. Some Bristle-thigheds are more brightly colored on the flanks and undertail coverts than on the central belly (see photos in Patterson 1998), whereas *hudsonicus* does not show contrastingly brighter flanks or undertail coverts.

Underpart Markings. The presence or absence of flank barring can be a helpful adjunct in Bristle-thighed Curlew identification. Bristle-thighed Curlews typically have unbarred flanks or have the barring limited to the far anterior flanks, though one specimen shows barring well into the rear flanks, as does a photo in Gill et al. (1988). In contrast, all Whimbrels have barring well onto their rear flanks and, in some, all the way to the undertail coverts. Thus, a bird with unbarred flanks is very likely a Bristle-thighed Curlew with one caveat: both species sometimes droop their wings, hiding any flank barring.

The presence of markings on the undertail coverts is said to be diagnostic for the Whimbrel, the lack of them diagnostic for the Bristle-thighed Curlew (Paulson 1993). Some Whimbrel specimens, however, have very few markings here and in the field could easily appear unmarked even under excellent conditions. None of the Bristle-thighed Curlew specimens had any undertail covert bars, streaks, or spots. Thus, in the field, plain undertail coverts are not diagnostic for the Bristle-thighed, but marked undertail coverts eliminate it.

The breast streaking on the Bristle-thighed often appears like that of a Pectoral Sandpiper (*Calidris melanotos*), with fine vertical streaks cut off sharply at the lower breast edge. Whimbrels usually do not look this way because of cross-barring on the lower breast feathers (in many but not all birds) and their barred flanks. Bristle-thigheds lack the chest cross-bars and often lack the flank barring. The Pectoral-like appearance is only mildly suggestive of the Bristle-thighed Curlew, but cross-bars on the chest streaking are likely diagnostic for the Whimbrel.

Bristled Thighs. The thigh bristles have often been regarded as nearly undetectable in the field, yet in spring 1998 many observers found them to be readily visible. Jeff Marks (pers. comm.) finds that they are often visible at 75 meters, if one is using a good scope under good lighting conditions. Also, the thighs of Bristle-thighed Curlews often look shaggy, an aspect lacking in the Whimbrel.

Back, Scapular, and Wing Covert Markings. In Bristle-thighed Curlews, the back feathers, scapulars, and wing coverts are roughly half dark brown and half orange-buff (excepting adults in worn plumage during the fall). In adult Whimbrels, these feathers are mostly dark brown, with only 10 to 25% of the surface area consisting of pale grayish-brown (not orange-buff) feather edging and spotting.

Juvenile Whimbrels, however, are much more brightly patterned, with at least one specimen in the Burke Museum approaching a fresh-plumaged Bristle-thighed Curlew in the size and color of its markings. Also, the October Bristle-thighed Curlew specimens in the Burke Museum are far duller than the spring birds, and the upperpart markings on these individuals are well within the range found on juvenile Whimbrels. Thus, while the back/scapular/wing-covert pattern is very useful in spring, it is of much less value for juveniles.

Rump and Uppertail Coverts. The pattern and color of the rump and uppertail coverts are two of the most reliable marks for the Bristle-thighed Curlew. In the Bristle-thighed, the rump and uppertail coverts are typically orange-buff (varying from rusty to pale buff), often with a few long fine streaks, whereas in *hudsonicus* they are brown with heavy brown markings. This gives the appearance of a plain, brightly colored rump patch, while in *hudsonicus* the rump is concolorous with the back. The Asian *variegatus* has a paler and whiter rump and uppertail coverts than *hudsonicus* with fewer markings but is still more heavily marked than a Bristle-thighed Curlew. We did find one Bristle-thighed Curlew specimen with a fairly heavily marked rump, the relatively unmarked region limited to the uppertail coverts only.

Tail Pattern and Color. Tail pattern and color are also among the most reliable characters for separation of the Whimbrel and Bristle-thighed Curlew. In the Bristle-thighed, the tail is brightly colored (like the rump) with dark brown bars, whereas in *hudsonicus* the tail is medium brown with dark brown bars. Consequently, the contrast between the pale and dark bars is much greater in the Bristle-thighed.

The Whimbrel has seven to nine dark bars about 6 mm apart, the Bristle-thighed only six to seven dark bars about 7 mm apart. *Variegatus* shows the same number of dark bars as *hudsonicus*, but its pale bars are paler than those of *hudsonicus*, thus showing more contrast. These pale bars, however, are whitish, with no warm buff hues as in the Bristle-thighed.

Primary Pattern. Paulson (1993) stated that in the Whimbrel the undersurfaces of the inner web of the outer four primaries (p7–p10) show distinct, large, pale notches, whereas in the Bristle-thighed Curlew there is only diffuse mottling. This mark mostly held up to specimen examination. Unfortunately, 3 of 64 Whimbrels in the Burke Museum collection showed the mottled pattern of a Bristle-thighed, and one of the thirteen Bristle-thigheds had a Whimbrel-like pattern.

A more useful mark may be found in the upper primary pattern. In the Bristle-thighed, the uppersurface of the inner five primaries (p1–p5) shows a bold whitish rear border that cuts across the feather tip to form a prominent triangle of whitish. In the Whimbrel, the rear border is lacking on some birds and narrow on others, often extending only from p1 to p3. No Whimbrel specimens showed the white terminal triangles.

For field observers, these two marks will rarely prove useful, though in some photos and specimens they could be valuable.

Underwing Coverts. A difference in underwing covert coloration has been previously suggested (Johnsgard 1981, Hayman et al 1986, Rosair and Cottridge 1995), with the Bristle-thighed described as more brightly

colored. We found no difference between the Bristle-thighed Curlew and *hudsonicus*, in agreement with Paulson (1993). *Variegatus* has quite different grayish underwing coverts.

On the other hand, the pattern of markings on the underwing coverts does appear to differentiate the Bristle-thighed Curlew from the Whimbrel. Sievert Rohwer noted that in all wing preparations in the Burke Museum, the underwing's greater primary coverts are barred heavily in the Whimbrel but are spotted or notched in the Bristle-thighed Curlew. The greater secondary coverts are heavily barred in both species, but Whimbrels have more bars.

Leg Shape. Many observers of the vagrants commented that the Bristle-thighed appeared to have shorter thicker legs and longer thicker toes. In many photos, Bristle-thigheds appear distinctly thicker legged, and at the Burke Museum Bristle-thighed Curlew tarsi averaged 6.9 mm in diameter, those of the Whimbrel 6.0 mm (these measurements may be affected somewhat by shrinkage). There was, however, a small amount of overlap. Leg length, however, is not significantly different (K. Garrett in litt, Higgins and Davies 1996). The shorter-legged appearance of the Bristle-thighed Curlew may be due to the increased thickness of the tarsi or to the tibia being obscured by shaggy thigh feathers.

Toe thickness and length are less well known. Specimens of the Bristle-thighed Curlews do appear to have thicker toes, owing mostly to more pronounced fleshy extensions at the sides of toes.

Call. The calls of the Whimbrel and Bristle-thighed Curlew are remarkably different. Whimbrels utter a series of sharp whistles, typically five to seven. Bristle-thighed Curlews usually give a two- or three-noted whistle variously described as "too-ee, tee-oo-whit, and wheet-o-weet" by Paulson (1993), "chiu-eet" by Marks and Redmond (1994a), and "chi-u-it and whee-wheeoo" by Hayman et al. (1986). The pattern of the Bristle-thighed's call resembles that of a Black-bellied Plover, but the quality is more strident and less plaintive. Many have noted that these whistles sound humanlike (D. Paulson pers. comm.). Marks and Redmond (1994a) also described a single noted "klee" call, and Peter Pyle (pers. comm.) remarked on a "jureeeee-jureeeee-jureee" call that resembles, in quality, the vocalizations of Long-billed Curlew (*Numenius americanus*). Many of the spring 1998 vagrants vocalized frequently, though some were quiet.

Habits. Witnesses of the 1998 spring invasion often commented on apparent differences in habitat and behavior between Whimbrels and the vagrant Bristle-thighed Curlews. One particularly dramatic behavior was that of whipping crabs. Some Bristle-thigheds seized crabs by the leg, then smashed them repeatedly into rocks or hard-packed sand with a whipping motion of the bird's head and neck. Some felt that this was to subdue the crab for access to its eggs (A. Jaramillo pers. comm.). The birds at the south jetty of the Columbia, however, grabbed crabs 2–5 cm in diameter and beat them until their carapaces were broken into small pieces and the interior flesh was well exposed, then eating it. This behavior is common among Bristle-thigheds with food items that are too large to be swallowed whole (Marks and Hall 1992). Remarkably, some Bristle-thigheds have learned to crack open albatross eggs by whipping stones into them with a similar

motion (Marks and Hall 1992). Whimbrels, on the other hand, seem rarely to engage in such head and neck whipping, though Higgins and Davies (1996) described it.

Another comment was that the Bristle-thighed often walked in a crouched manner, somewhat like a rail (H. Nehls, M. Patterson pers. comm.). This action appears quite different from the usual movements of a Whimbrel.

There also appeared to be habitat differences. Whimbrels favor tidal flats along the coast, whereas the Bristle-thigheds shunned these and were most often found on beaches, at the base of jetties, and on grassy sand dunes. The birds along jetties walked among the rocks in search of prey. Though Whimbrels can sometimes be seen at these same locations, the difference between the two species' preferences seemed distinct.

Although these habitat and behavioral differences are not suitable for identification, they might serve well as a red flag, drawing attention to a vagrant.

We found several marks to be strongly suggestive but not fully conclusive. In spring, a brightly colored back and wings eliminate the Whimbrel, but the reverse is not necessarily true. A duller backed bird could be a Bristle-thighed in worn plumage. Flank barring and undertail covert markings typically are quite different but in the field may be difficult to discern and are not definitive. If the underparts are brightest on the flanks and undertail coverts, the bird is likely a Bristle-thighed Curlew, but the reverse is definitely not true. Upper primary pattern is quite useful in specimens and some photos, and may even be diagnostic, but field use is limited. Similarly, the under greater primary covert pattern also appears to be diagnostic but difficult to use in the field. The underprimary pattern will identify a Bristle-thighed or Whimbrel with about 90 to 95% accuracy and is also best assessed in specimens or fortuitous photographs. The Bristle-thighed's prey-slamming behavior appears to be quite unusual in Whimbrel and, if observed, would also point strongly but not absolutely to the Bristle-thighed.

Further features that may be useful but are only suggestive include underpart coloration, leg thickness, and toe thickness. Bill size and curvature, bill color, leg length, and underwing coloration are likely not useful.

SUMMARY

Between 26 April and 30 April 1998, at an elevation typical for migrating curlews, a highly unusual weather pattern prevailed over the central North Pacific—an anomaly associated with the West Pacific Oscillation, not El Niño. Shortly thereafter, between 13 and 17 Bristle-thighed Curlews were recorded from Point Reyes, California, to Tatoosh Island, Washington. These two events were likely linked. Any Bristle-thighed Curlews heading north between 26 April and 30 April 1998 would have encountered extremely strong headwinds, giving them the choice of continuing onward and facing the risk of running out of fuel or reorienting downwind in search of land. Such reorientation would have placed these birds on the North American coast between southern California and southernmost British Columbia with an arrival date between 28 April and 1 May.

The number of Bristle-thigheds that landed on the West Coast was undoubtedly greater than the number seen. Our estimates suggest that between 60 and 150 birds actually made landfall. Not unlikely, additional birds never made it to land, either by failing to reach the west coast or by continuing on into the storm. A significant portion of the small world population may well have been placed at risk by this anomalous weather.

Identification of the Bristle-thighed Curlew is complex. Few marks are absolutely reliable for identification, and previously published discussions have not been entirely accurate. The tail and rump remain the key, as in all plumages, the pattern and coloration of these areas consistently distinguish the Bristle-thighed Curlew from the Whimbrel. Even when the bird is on the ground, the tail pattern and color can usually be seen. The call of each species is diagnostic. The thigh bristles, if seen, eliminate the Whimbrel. The 1998 invasion proved to be a fine opportunity for birders to become familiar with Bristle-thighed Curlew identification. The prospect of future accurate reports of this species has certainly been enhanced.

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APPENDIX 1. Records of Vagrant Bristle-thighed Curlews in North America

Spring 1998: Adequately Supported

Floras Lake, Curry Co., Ore. (1); 6 May (D. Lauten, K. Castelein)
Ocean Shores, Grays Harbor Co., Wash. (2); 8 May (B. Sundstrom, H. Opperman)
South Jetty Columbia River, Clatsop Co., Ore. (3, photographed); 9–21 May (H. Nehls)
Ocean Shores, Grays Harbor Co., Wash. (1, photographed); 12–14 May (P. W. Smith)
Tatoosh Island, Clallam Co., Wash. (1); 13–15 May (R. Paine, T. Wooton)
Newport, Lincoln Co., Ore. (2, photographed); 13–15 May (E. Horvath)
Tatoosh Island, Clallam Co., Wash. (1, specimen); 14 May (R. Paine, T. Wooton)
Battery Point, Del Norte Co., Calif. (1, photographed); 14–16 May (A. Barron)
Point Reyes, Marin Co., Calif. (1, photographed); 16–25 May (C. and L. Lieurance, G. Griffeth)
Westport, Grays Harbor Co., Wash. (1); 18 May (G. Revelas)
Bandon Marsh/New River mouth, Coos Co., Ore. (1); 19–23 May (D. Lauten, K. Castelein, S. Brown)
Ocean Shores, Grays Harbor Co., Wash. (1–2, photographed); 20–24 May (D. Paulson)

Spring 1998: Inadequately Supported
Point Reyes, Marin Co., Calif. (2); 6 May
Humboldt Co., Calif. (1); 9 May
South Jetty Columbia River, Clatsop Co., Ore. (5); 14 May

Before 1998: Adequately Supported
Grant Bay, Vancouver I., B.C.; 30–31 May 1969 (Richardson 1970)
Bandon, Coos Co., Ore. (2); 16 September 1981 (Gilligan et al. 1994)
Leadbetter Point, Pacific Co., Wash.; 1 May 1982 (Widrig 1983)
Blackie Spit, along Boundary Bay, B.C.; 13–14 May 1983 (Campbell et al. 1990)

Before 1998: Inadequately Supported
Near Tofino, Vancouver I., B.C.; 1 September 1982 (Campbell et al. 1990)
Victoria, Vancouver I., B.C.; 11 September 1986 (K. Taylor pers. comm.)
Leadbetter Point, Pacific Co., Wash. (2); 18 May 1980 (Widrig 1983)

APPENDIX 2. Records of Vagrant Shorebirds from Western North America South of Alaska and Paralleling the Spring 1998 Irruption of the Bristle-thighed Curlew

The 1998 reports from California are all under review by the California Bird Records Committee; some may not be accepted. We, however, feel these reports are correct.

Gray-tailed Tattler
- Point Reyes, Marin Co., Calif.; 24–26 May 1998 (K. Hansen, S. N. G. Howell)
- Bodega Head, Sonoma Co., Calif.; 30 May 1998 (R. Rudesill)
- Princeton Harbor, San Mateo Co., Calif.; 6 June 1998 (A. Jaramillo)

Asiatic Whimbrel
- Ocean Shores, Grays Harbor Co., Wash.; 16 May 1987 (Paulson 1993)
- Ocean Shores, Grays Harbor Co., Wash.; 16 May 1998 (P. W. Smith)

Bar-tailed Godwit
- Ten previous spring records extending from 21 April to 10 June (Mlodinow and O'Brien 1996, NASFN 50:323).
- Ocean Shores, Grays Harbor Co., Wash.; 27 May 1998 (B. Shelmerdine)

Red-necked Stint
- Arcata, Humboldt Co., Calif.; 5 May 1969 (Harris 1996)
- Iona Island, Vancouver area, B.C.; 20 May 1997 (NASFN 51:914)

Sharp-tailed Sandpiper
- Leadbetter Point, Pacific Co., Wash.; 26 April 1979 (Mlodinow and O'Brien 1996)
- Lancaster, Los Angeles Co., Calif.; 5–9 May 1982 (Mlodinow and O'Brien 1996)
- Kern Natl. Wildlife Ref., Kern Co., Calif.; 8–10 May 1984 (Mlodinow and O'Brien 1996)
- Pescadero, San Mateo Co., Calif.; 14 May 1994 (Mlodinow and O'Brien 1996)

FIRST RECORD OF THE AMERICAN WOODCOCK FOR CALIFORNIA, WITH A SUMMARY OF ITS STATUS IN WESTERN NORTH AMERICA

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On 3 November 1998, Patten, McCaskie, and Daniel S. Cooper discovered an American Woodcock (*Scolopax minor*) at Iron Mountain Pumping Plant in southeastern San Bernardino County, California. Patten first noted the bird at about 0715 PST as it stood in a yard beneath a large planted elm. We subsequently studied it through binoculars for 15 minutes at close range (5–10 m) as it waddled around on a lawn and hid in an adjacent flowerbed; it also flew on two occasions. Viewing conditions were excellent (it was clear and 55°–60° F, with a stiff Beaufort 3–4 northerly wind).

This woodcock could not be located on 4 November (Walter Wehtje pers. comm.) or 5 November (*fide* Chet McGaugh). Patten rediscovered it at 0830 PST on 7 November. Morlan, Robbie Fischer, and Karen Gilbert observed it later that day (1530–1700 PST). It could not be located on 8 November (Mike San Miguel pers. comm.) but was observed and photographed (Figures 1–3) by Don Roberson during the morning (0630–0730 PST) of 9 November. It was not seen thereafter (*fide* Larry Sansone et al., pers. comm.).

This bird represents the first record for California of an apparently wild American Woodcock. Furthermore, it appears to represent the first photographically documented record of the species west of the continental divide.

DESCRIPTION

The following description is from notes by Patten and Morlan, with supplementary information from notes by McCaskie, Fischer, and Gilbert and photographs and notes supplied by Roberson:

Behavior and Vocalizations. The woodcock wobbled about when it walked. Much of this movement was a combined dipping and side-to-side wiggle of its body, with little head movement. It walked and stood with its bill pointed downward at about a 45° angle and slightly cocked its stubby tail. It roosted like most birds, with its bill tucked deeply into its back feathers. It roosted on the ground in a shady spot beneath low shrubs. It tended to keep its eyes at least partly open even when roosting.

This bird never vocalized, although it did produce a distinctive sound: the wings emitted a strangely musical whistling when it flew, a sound reminiscent of the wing whistle of a Mourning Dove (*Zenaida macroura*), but distinctly more trilled and squeaky.

General Appearance, Bare Parts, and Structure. The bird resembled a snipe in its plump build, short legs, short tail, and extremely long bill. It was larger and stockier than a Common Snipe (*Gallinago gallinago*) in overall

Figure 1. American Woodcock at Iron Mountain Pumping Plant, San Bernardino County, California, 9 November 1998. The black barring on the rear crown is diagnostic of *Scolopax*.

Photograph by Don Roberson

Figure 2. American Woodcock at Iron Mountain Pumping Plant, San Bernardino County, California, 9 November 1998. Note the unbarred cinnamon underparts.

Photograph by Don Roberson

Figure 3. American Woodcock at Iron Mountain Pumping Plant, San Bernardino County, California, 9 November 1998. Note the bold gray "V" on the mantle and the gray stripes through the scapulars.

Photograph by Don Roberson

girth and mass. Furthermore, it was stockier than a snipe and had a large head with prominent large black eyes situated closer to the crown than on any bird we have seen.

Its bill was twice as long as the head, quite deep at its base, and dull pinkish on the basal one-third and gray-brown distally. We did not note differences in color between the maxilla and mandible. The short, sturdy legs were dull grayish pink. It looked nearly tailless. On short, rounded wings, it flew as it stood, with its bill pointing downward at a 45° angle.

Plumage Pattern and Coloration. The bird had the typical woodcock plumage pattern (shared by all six species of *Scolopax*): wide black bars on the crown and nape, intricately patterned upperparts, and simply patterned underparts.

The head was mostly unmarked rich buff (approaching pumpkin orange), emphasizing the huge black eyes. The eyes were encircled by a nearly complete eye ring that was buff above and white with a bluish cast below. Thin rusty-buff bars narrowly separated three wide squared-off black bars on the nape and hindcrown; the top of the crown had a fourth black bar much narrower than the other three. A jagged black line through the eye was thicker and darker in the lores. Another duller black stripe was on the lower rear edge of the auriculars. The crown was gray, contrasting with the buff forehead, black nape bars, and buff auriculars.

The back feathers were grayish with fine buff vermiculation on both webs. Each back feather was narrowly fringed with rich buff. The mantle was framed by a broad pale gray stripe on either side (formed by the lower scapulars); these stripes formed a prominent pale "V" on the upperparts that was readily visible even when the bird roosted. The upper scapulars had black lobate centers with pointed tips and notched edges. The wing coverts were largely rusty, frosted with gray. The coverts had a complex internal pattern of black marks and lines.

The underparts were uniform unmarked rich buff from the chin to the undertail coverts, save for a warm ruddy wash on the sides of the breast that softly contrasted with the remainder of the underparts. We did not note the pattern on the undertail coverts or the rectrices. The long uppertail coverts mostly hid the tail, although black tips to the rectrices were barely visible. The uppertail coverts were buff with coarse blackish transverse vermiculations.

IDENTIFICATION SUMMARY

Distinguishing the American Woodcock from the five other woodcock species is not difficult (Hayman et al. 1986). Three others, the Eurasian (*S. rusticola*), the Amami (*S. mira*) of the Ryukyu Islands, and the Dusky Woodcock (*S. saturata*) of Indonesia, have extensively barred underparts. The other two, the Celebes Woodcock (*S. celebensis*) of Sulawesi and the possibly extinct Obi Woodcock (*S. rochussenii*) of the Moluccas, lack the bold gray "V" on the mantle, are larger, and have a different body color and feather patterning.

Ageing and sexing of the American Woodcock are probably impossible in the field because the sexes are basically identical (except for females being over 10% larger, with longer bills) and juveniles look virtually the same as adults (Martin 1964, Prater et al. 1977, Hayman et al. 1986:347). There may be some tendency for juveniles to have a slightly grayer chin, throat, and auriculars (Paulson 1993, Keppie and Whiting 1994). See the key in Martin (1964) or Sheldon (1967:203) for detailed information about ageing this species in hand by the pattern on the inner secondaries.

DISTRIBUTIONAL SUMMARY

The American Woodcock occurs in North America east of the Great Plains. It breeds from southeastern Manitoba east through the Maritime Provinces of Canada and south nearly to the Gulf of Mexico (Nero 1977, 1986, Keppie and Whiting 1994, A.O.U. 1998). In recent decades the western edge of its breeding range has expanded slightly into eastern North Dakota, South Dakota, Kansas, Oklahoma, and Texas (Smith and Barclay 1978). It winters in the southern third of its breeding range, south to the Gulf Coast and through central Texas sparingly to the lower Rio Grande valley (Keppie and Whiting 1994).

The American Woodcock has been recorded west of its normal range on over 30 occasions (Appendix), mainly east of the continental divide (Figure 4). There are records for Saskatchewan, Montana, Wyoming, Colorado,

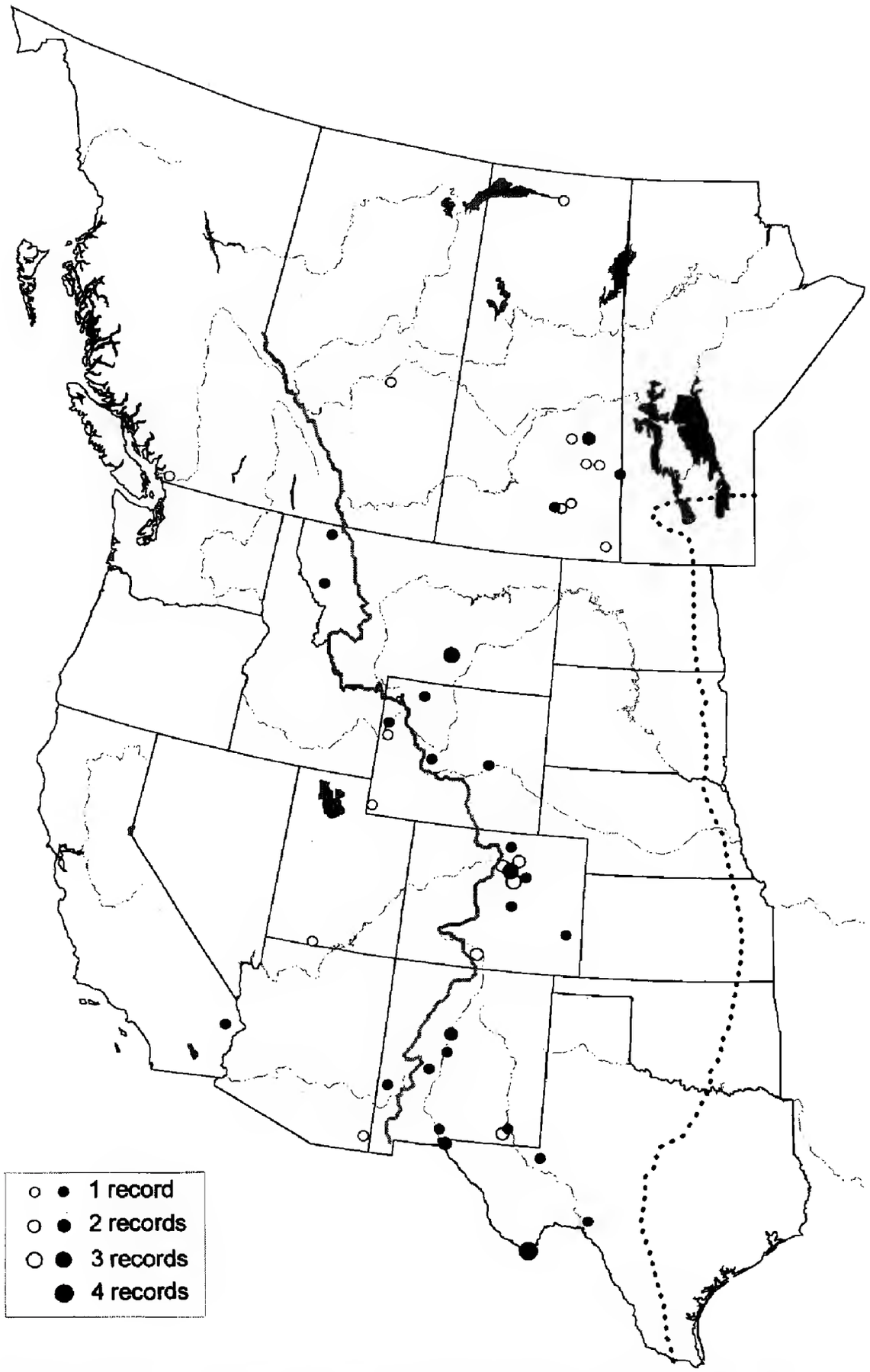

Figure 4. Western edge (dotted line) of regular breeding and wintering distribution of the American Woodcock (*Scolopax minor*) and locations of extralimital records in the western United States and Canada (Appendix). Solid circles represent well-documented or generally accepted records. Empty circles represent hypothetical or questionable reports. Note that the vast majority of extralimital records are east of the continental divide (gray line).

New Mexico, and the trans-Pecos region of Texas (Hubbard 1978, DeSante and Pyle 1986, Andrews and Righter 1992, Smith 1996, Peterson and Zimmer 1998). Many reports for Colorado and Saskatchewan are problematic, and all reports for Alberta are generally treated as hypothetical (Salt and Salt 1976:492, Pinel et al. 1991, Semenchuk 1992, *cf.* A.O.U. 1998). This species has wandered south of its normal range to Bermuda (A.O.U. 1998) and in Mexico to San Luis Potosí, Tamaulipas, and even the Yucatan Peninsula (Howell and Webb 1995). It has appeared sporadically during migration northeast of its usual range on the islands of St. Pierre and Miquelon (Tuck and Borota 1972).

There were only four well-documented records of the American Woodcock west of the continental divide prior to the California record: sight records for western Montana at Ninemile Creek (Bergeron et al. 1992, Paulson 1993) and Eureka (Wright 1996), along Sacaton Creek, New Mexico, within sight of Arizona (S. O. Williams *in litt.*), and at Jackson, Wyoming (J. Priday *in litt.*). A sight report from coastal British Columbia is treated as valid by Paulson (1993) but as hypothetical by Campbell et al. (1990); we follow the latter. There is also a hypothetical report for southeastern Arizona (Monson and Phillips 1981) that has not been reviewed by the Arizona Bird Committee and is thus not on its list of birds recorded in Arizona (Gary H. Rosenberg *in litt.*). One reported at Kanab, Utah, is not considered acceptable (Sorensen et al. 1985).

Records for southeastern Saskatchewan suggest occasional breeding (Rudolf F. Koes *in litt.*). Aside from three anomalous but well-documented July/August records for Colorado and New Mexico, the vast majority of records of vagrants south of Canada have been during the species' normal migration periods (Figure 5). The American Woodcock migrates as early as late September, but the bulk of fall migration takes place between mid-October and early December, with a peak around early November (Smith and Barclay 1978, Keppie and Whiting 1994). It winters as far north as southern Missouri and Tennessee in the interior and Long Island on the Atlantic Coast (Keppie and Whiting 1994).

Some 599 American Woodcocks were released in California from 1972 through 1974 (Table 1) in a failed attempt by the California Department of Fish and Game to establish this species as a game bird (Kidd and Harper 1974). No woodcocks have been released in California since January 1974, although a few persisted in the state subsequently. The last was recorded in 1982 near Santa Rosa, Sonoma County (Sam Blankenship *in litt.*). The released birds were from 663 trapped in Louisiana (64 died in transit); fifteen were subsequently observed or found dead in 1972 and 1973, 11 of them near release sites. As revealed by band recoveries, three individuals dispersed great distances from California (Kidd and Harper 1974): one was hit by a car in Alberta, 20 January 1972, one was found dead at Cummings Lake near Ely, Nevada, 13 March 1973 (see Alcorn 1988:157), and one was shot by a hunter at Blue River in eastern Kansas, 19 November 1973 (Kidd and Harper 1974). These authors attributed a 19 October 1972 sighting 200 km northwest of Anchorage, Alaska, to the California releases, but the record is undocumented and ignored (Thede Tobish *in litt.*).

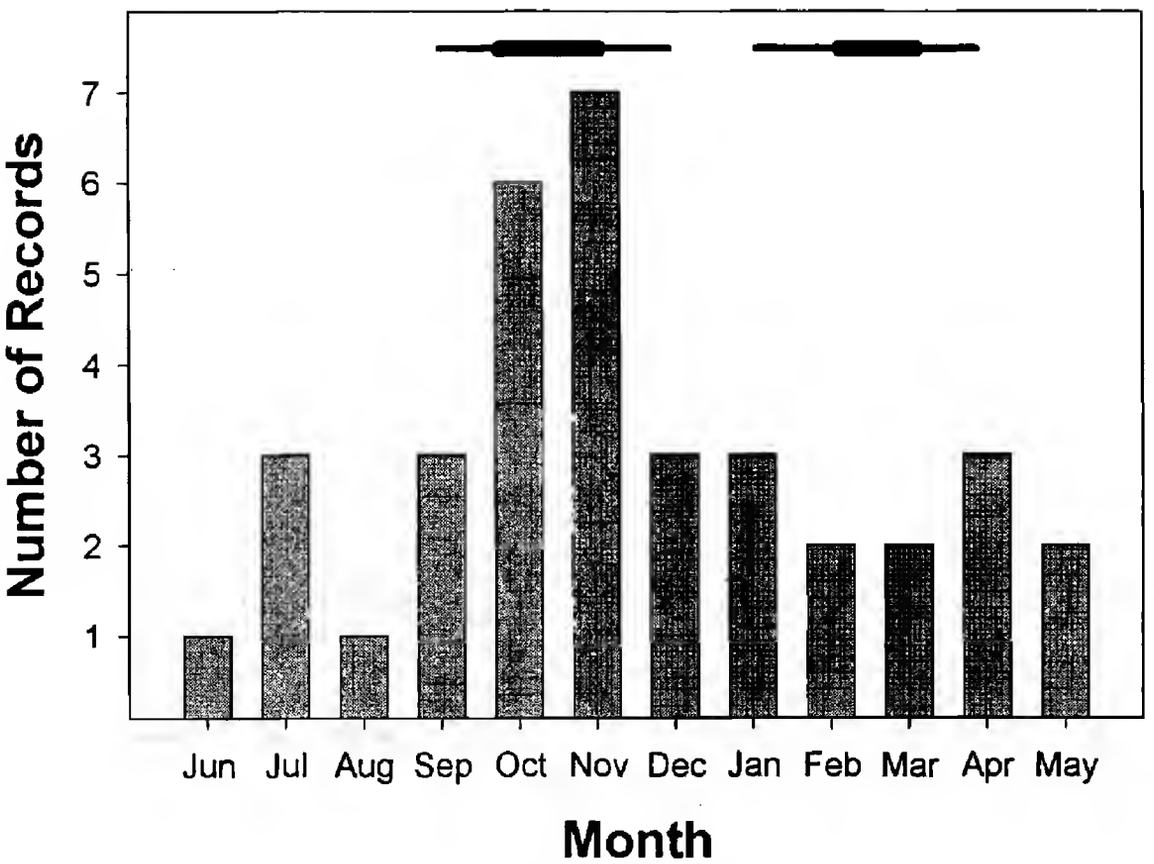

Figure 5. Temporal pattern of extralimital occurrence of the American Woodcock (*Scolopax minor*) in the western United States and Canada. Bars above the histogram represent its normal migration period (heavier bars are peak periods) in eastern North America (Smith and Barclay 1978).

The bird at Iron Mountain appeared at the peak of woodcock migration in eastern North America, fit the temporal pattern of most other extralimital records of the species (Figure 5), and occurred nearly a quarter-century after the release program in California ceased. Therefore, we conclude this record establishes a first for California of a naturally occurring American Woodcock, a sentiment shared by Sam Blankenship (*in litt.*), who was involved in the release program.

ACKNOWLEDGMENTS

We thank Karen Gilbert, Chet McGaugh, Don Roberson, Mike San Miguel, Larry Sansone, and Walter Wehtje for keeping us current about their successes or failures in locating this American Woodcock. Gilbert, Roberson, and Robbie Fischer graciously supplied copies of their descriptions, and Roberson supplied the photographs. Jutta C. Burger assisted with preparation of the map. We received helpful information about introductions from Kimball L. Garrett and Sam Blankenship, about migration timing from Paul E. Lehman, and about ageing from Peter Pyle. We are indebted to Rudolf F. Koes (Alberta, Saskatchewan), Greg W. Lasley (Texas), Tony L. Leukering (Colorado), Jeffrey S. Marks (Montana), Jim Peterson (Texas), John Priday (Wyoming), Gary H. Rosenberg (Arizona), Thede Tobish (Alaska), and Sartor O. Williams III (New Mexico) for providing information about records of the American Woodcock in the West. We thank Robert W. Nero, Philip Unitt, and Sartor O. Williams III for comments on the manuscript.

Table 1 Releases of the American Woodcock into California[a]

Location	Year(s)	Number
Butte County	1973	29
Colusa County	1972	61
Mendocino County	1972	40
Sacramento County	1972–1974	294
San Joaquin County	1973	33
Sonoma County	1972	61
Sutter County	1972–1973	81
Total		599

[a]Data corrected from Kidd and Harper (1974), who erroneously reported on releases 19–20 January 1972. Attempts at establishing a game population in the state failed.

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APPENDIX. Extralimital records of the American Woodcock in western North America (the western states and the Trans-Pecos region of Texas). Records we consider valid are preceded by a numeral (i.e., the record was accepted by a local records committee or state authority). A question mark indicates that an exact date for the record is not known. Museum abbreviations: DMNH, Denver Museum of Natural History, Denver, Colorado; NMSU, New Mexico State University, Las Cruces; UNM, University of New Mexico (Museum of Southwestern Biology), Albuquerque; UTEP, University of Texas, El Paso.

1. 9 (not 12) August 1885: Colorado; vic. Denver (Smith 1886, DMNH 14760)
   ? October 1885: Colorado; vic. Denver (Smith 1886)
   "fall" 1887: Colorado; vic. Boulder (Smith 1895)
   "fall" 1887: Colorado; Fort Lupton (Smith 1895)
   8 August 1892: Saskatchewan; Portage (Mitchell 1924, Nero 1963, Houston et al. 1981)
   8 June 1895: Colorado; Denver (Cooke 1897, Bergtold 1917)
   24–30 May 1905: Colorado; vic. Boulder (Henderson 1909)
2. ? September 1906: Wyoming; Cody (Grave and Walker 1913; specimen)
   "before 1927": Wyoming; Evanston (McCreary 1939:35, Dorn and Dorn 1990:48)
3. 16 September 1945: Colorado; Bennett (DMNH 24766)

4–6. 23 October 1917 (3): Montana; Billings (Saunders 1921, 3 specimens)
   19 April 1959 (3): Colorado; Cherry Creek Reservoir (Bailey and Niedrach 1965:325)
   3 December 1959 (5): Colorado; Hot Creek (Bailey and Niedrach 1965:325)
   5 March 1960: British Columbia; N. Surrey (Campbell et al. 1990:487, Paulson 1993)
   6 November 1960: Colorado; Hot Creek (Bailey and Niedrach 1965:325)
   ? 1960: Saskatchewan; Qu'Appelle (Harrison 1960, Houston et al. 1981)

7. 25 January 1964: New Mexico; 3 km n. Mesilla Dam (Harris 1965, NMSU 2767)
   17 April 1965: Colorado; Evans Ranch (Bailey and Niedrach 1965:325)
8. 2 November 1965: Texas; Big Bend National Park (Oberholser 1974:325)
   "since May" 1966: Saskatchewan; Regina (Smith 1996)
9. 29 March 1969: New Mexico; 16 km w. Magdalena (UNM specimen)
10. 15 November 1972: Texas; Big Bend National Park (Wauer 1996)
11. 24 November 1973: Texas; Big Bend National Park (Wauer 1996)
12. 5 July 1974: Colorado; vic. Fort Collins (Andrews and Righter 1992)
    29 September 1974: Alberta; Edmonton (Salt and Salt 1976, Pinel et al. 1991)
    16 February 1976: Arizona; Cave Creek Canyon (Monson and Phillips 1981:42)
13. 16 (not 17) April 1977: Wyoming; Jackson (*Am. Birds* 31:1028, J. Priday *in litt.*)
    15 May 1977: Wyoming; Jackson (*Am. Birds* 31:1028)
    5–6 May 1978: Saskatchewan; Moose Mountain (Houston et al. 1981)

14. 26 October 1980: Colorado; Colorado Springs (DMNH 37309)
    22 December 1981: Utah; Kanab (Sorensen et al. 1985)
15. 9 July 1982: New Mexico; Isleta (*Am. Birds* 36:1006)
16. 1 October 1983: Montana; Ninemile Creek (Bergeron et al. 1992)
17. 6 October 1983: Texas; Big Bend National Park (Wauer 1996)
    13 May 1984: Saskatchewan; Hazel Dell (Smith 1996)
18. 27 December 1984: Texas; El Paso (*Am. Birds* 39:183, photographed)
    ? February 1986: New Mexico; Rattlesnake Springs (S. O. Williams III *in litt.*)
    16 January 1987: New Mexico; Rattlesnake Spr. (*N. M. Orn. Soc. Field Notes* 26(1):7)
    ? May 1987: Saskatchewan; s. of Preeceville (Smith 1996)
19. 10 November 1987: New Mexico; Albuquerque (*Am. Birds* 42:117, photo)
20. 21 May 1988: Saskatchewan; Duck Mtn. Prov. Park (*Am. Birds* 42:451)
21. 5 September 1988: Montana; Eureka (Wright 1996)
22. 22 June–7 July 1989: Saskatchewan; Somme (*Am. Birds* 43:1331, Smith 1996)
23. 3–4 April 1990: Saskatchewan; Regina (*Am. Birds* 44:446)
24. 2 July–3 September 1990: Saskatchewan; Somme (Smith 1996)
25. 28–30 November 1990: Colorado; Boulder (Andrews and Righter 1992)
26. 12 March 1991: New Mexico; Sacaton Creek (*Am. Birds* 45:482)
27. 19 December 1994–12 January 1995: Wyoming; Lander (J. Priday *in litt.*)
28. 25 January 1995: Texas; El Paso (*Field Notes* 49:167, UTEP specimen)
29. 27 January 1996: New Mexico; Rattlesnake Springs (*Field Notes* 50:204)
30. 22 February 1996: Texas; Devils River State Nat. Area (*Field Notes* 50:190, photo)
31. 7 November 1996: Wyoming; Casper (J. Priday *in litt.*)
32. 5–10 February 1997: New Mexico; Albuquerque (*Field Notes* 51:783, photo)
    "early May" 1997: Saskatchewan; Porcupine Plain (*Field Notes* 51:885)
33. 15 December 1997: Colorado; vic. Boulder (*Field Notes* 52:231)
34. 21 April 1998: Texas; Monahans (*Field Notes* 52:355, photo)
35. 3–9 November 1998: California; Iron Mountain (reported herein, photo)
36. 11 May 1999: Colorado; Lamar (*fide* V. A. Truan and B. K. Percival)

SPRING MIGRATION OF SPECTACLED EIDERS AT CAPE ROMANZOF, ALASKA

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The Spectacled Eider, *Somateria fischeri*, was described for science from St. Michael, Alaska, over 150 years ago. Its nonbreeding range remained unknown until recently, however, when concentrations of molting and wintering eiders in the Bering and Chukchi seas were finally revealed by satellite telemetry (Petersen et al. 1995, 1999). Because most of the satellite transmitters used to date failed by late winter (Petersen et al. 1995), the areas used by Spectacled Eiders in the early spring just prior to breeding and the routes used by migrant eiders en route to their breeding grounds in the Yukon–Kuskokwim delta remain unknown. Specifically, it is not known whether spring migrants fly directly to the delta from the area occupied in late winter or from an undiscovered spring staging area.

Unlike virtually all other waterfowl species breeding in the central Yukon–Kuskokwim delta, Spectacled Eiders arrive in the spring from the north or northwest (Conover 1926, Dau and Kistchinski 1977). Because of this direction of arrival, Dau and Kistchinski (1977) hypothesized that Spectacled Eiders stage in the northern Bering Sea or Bering Strait prior to departure for the breeding grounds in the delta. The recent discovery of wintering concentrations southwest of St. Lawrence Island (Petersen et al. 1995, 1999) neither supports nor refutes this hypothesis. Theoretically, spring migrants could fly directly from the vicinity of St. Lawrence Island to the delta or they could depart from a more northern staging area, fly down the Bering Sea coastline, then turn inland once they arrive at the delta (Figure 1). In both cases, observers away from the immediate coast in the central delta would detect them arriving from the northwest.

To investigate these alternatives, we monitored the spring migration of Spectacled Eiders at Cape Romanzof, which lies immediately to the north of the main breeding grounds in the Yukon–Kuskokwim delta. Because the cape is only slightly south of the wintering area, spring migrants could fly almost directly southeastward from the wintering area to the breeding grounds without passing it (Figure 1). If the eiders were migrating south along the coast from a staging area farther north, however, they would pass near Cape Romanzof en route to the breeding grounds.

STUDY SITE

Cape Romanzof (61° 49′ N, 166° 5′ W) projects into the Bering Sea at the western end of the Askinuk Mountains between Scammon and Kokechik bays (Figure 1). The Askinuk Mountains rise to more than 700 m elevation at Towak Mountain, 9 km east of the cape, and lie just north of the main breeding grounds of the Spectacled Eider in the Yukon–Kuskokwim delta (U.S. Fish and Wildlife Service 1996).

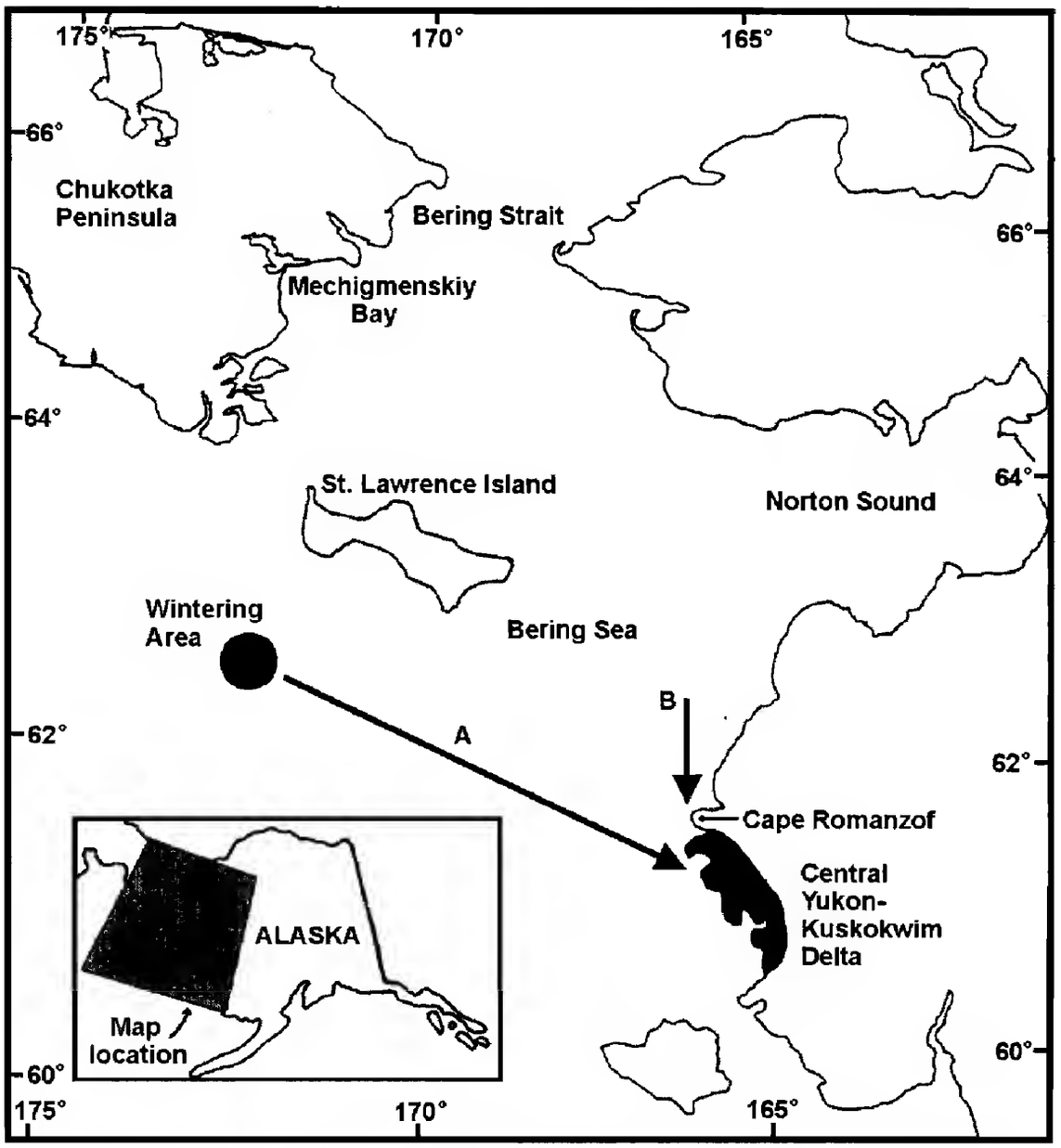

Figure 1. The northern Bering Sea, showing the major localities mentioned in the text, including the 1997 wintering area (adapted from Petersen et al. 1999). (A) Hypothetical spring migration route if Spectacled Eiders fly directly from the wintering area to the central Yukon–Kuskokwim delta. (B) Observed orientation of Spectacled Eiders approaching Cape Romanzof during spring migration.

METHODS

We counted migrating Spectacled Eiders at Cape Romanzof from 25 April to 15 May 1997. Two observers made observations with 10 × 40 binoculars and/or zoom spotting scopes from sites 75–125 m above sea level with northern or northwestern exposures. We chose observation sites daily in response to local weather conditions; most were located in the lee of exposed tors and outcroppings. We conducted formal counts between 0600 and 2230 Alaska Standard Time. This 16.5-hr period equaled the average period of daylight during the study. Previous studies of migrating sea ducks indicate that day-to-day variation in numbers of migrants exceeds variation

within a day (Herter et al. 1989, Suydam et al. 1997). To minimize the effects of day-to-day variation on the precision of estimates, we used a stratified random design for scheduling observations, with 90-min intervals as the sample units and days as the strata. For each day, we randomly selected for sampling six of the eleven 90-min intervals between 0600 and 2230. Data recorded for each flock included flock size, species composition, sex composition, direction of flight, and distance from shore. From 6 to 15 May, we also noted the sex of the bird leading the flock. We also collected comparable data for all flocks prior to and between sampling intervals. At all times, we recorded flocks detected only within 1.5 km of shore (estimated by reference to landmarks of known distance) because we could not confidently distinguish the Spectacled from the Common Eider (*S. mollissima*) at greater distances. Finally, during each sampling interval, we noted whether visibility was complete for the entire interval (i.e., not obscured by fog or precipitation out to a distance of 1.5 km) or incomplete (partially obscured during some portion of the period).

We were at Cape Romanzof for 103 90-min sampling intervals on 20 days from 25 April to 15 May; severe weather prevented us from reaching the cape safely on 14 May. Because of dense fog surrounding the cape, however, we could collect data during only 94 of the 103 sampling intervals. We had complete visibility during 63 sampling intervals.

For each day, we calculated the mean number of Spectacled Eiders migrating per 90-min interval by averaging the six samples; we estimated the daily total by multiplying this mean migration rate by a factor of 11 (the number of sampling periods in a day). We then estimated the total number of eiders passing Cape Romanzof over all days with formal sampling by summing the daily estimates. We generated estimates (with 95% confidence limits) for data collected during periods of incomplete visibility separately from periods of complete visibility. We also report a total count of migrants detected (with no error term), calculated by summing all observations made both during and outside of formal sampling intervals, representing a minimum estimate of the number of Spectacled Eiders passing Cape Romanzof.

RESULTS

The first flocks of Spectacled Eiders were seen on 27 April, the next flocks were not seen until 5 May, and the peak passage occurred on 6 May. Eiders were still migrating past Cape Romanzof on 15 May, our last day in the field.

We recorded 80 flocks of Spectacled Eiders during the study. Fifty-three flocks (66% of all) approached Cape Romanzof from the north, and 27 (34%) approached from the northeast. The mean flock size was 10.6, the median flock size was 6.0, and the modal flock size (29% of all flocks) was 2. We determined the sex of all birds in 79 of the 80 flocks, resulting in a total count of 420 males and 399 females (sex ratio 1.05). The first flock seen on 27 April had the most skewed sex ratio of the study, with 42 males and 21 females. That flock excluded, the overall sex ratio during the rest of the study was exactly 1.0. This result did not derive simply from flocks with skewed sex ratios canceling each other out over the course of the migration. Instead, 60 of the 79 sexed flocks (76%) had an even sex ratio, and 12 more (15%)

varied from an even sex ratio by only a single bird. Between 6 and 15 May, 48 of 49 flocks (98%) were led exclusively by a female; the lead alternated between the male and the female at the head of the other flock. In most linear flocks, females and males alternated regularly from the front of the flock to the rear.

Other species of sea ducks observed during our study, including the Common Eider, Oldsquaw (*Clangula hyemalis*), and White-winged Scoter (*Melanitta fusca*), regularly courted, loafed, and fed in the nearshore waters surrounding the cape; most Spectacled Eiders, however, flew past without stopping. Only 9% of Spectacled Eider flocks (including only 5% of individuals) landed on the waters around the cape.

We recorded 844 Spectacled Eiders during the study. Of these, 573 (68%) were recorded during sampling intervals. For all sampling intervals with some visibility, we estimate that 1327 ± 425 Spectacled Eiders flew south within 1.5 km of Cape Romanzof. For intervals with complete visibility only, the estimated total was 1677 ± 365 Spectacled Eiders.

DISCUSSION

We suspect that the Spectacled Eiders flying south past Cape Romanzof were directly en route to breeding sites in the central Yukon–Kuskokwim delta. Four lines of evidence support this conclusion. First, the sex-ratio data indicate that the vast majority of birds were paired. Second, we saw no subadult-plumaged birds, which are extremely rare on the breeding grounds (Dau and Kistchinski 1977) but probably would be common in flocks of nonbreeders. Third, one of the females retained a nasal disk that had been attached to her while nesting in the delta in a previous year. Finally, the peak passage of Spectacled Eiders past the cape (6 May) preceded the peak arrival at breeding sites 60–125 km to the southeast by only one day (P. L. Flint and C. L. Moran pers. comm.), suggesting that the eiders passing the cape were en route directly to those areas.

Between 1993 and 1997, approximately 3400 pairs of Spectacled Eiders nested annually in the Yukon–Kuskokwim delta (T. D. Bowman and R. A. Stehn pers. comm.). If we assume that the migrant eiders we detected were breeding pairs, we actually saw >12% of the delta's eiders during daylight hours as they passed Cape Romanzof from 25 April to 15 May, and the estimated passage (based on sampling) represented 20–25% of the entire delta population. For several reasons, these estimates are probably minimal. We did not sample on 14 May because of a severe storm with strong southeast winds. Although migration of Common and King eiders (*S. spectabilis*) at Barrow, Alaska, can be virtually stopped by strong headwinds (R. H. Day pers. comm.), we regularly observed migrant Spectacled Eiders flying south into headwinds, including sustained winds of up to 50 km/hr, with gusts to 80 km/hr. We suspect, therefore, that some Spectacled Eiders may have migrated past the cape on 14 May, despite the storm. We also suspect that we simply failed to detect some of the eiders passing by during sampling intervals. Among all of the species of sea duck at Cape Romanzof, the Spectacled Eider was the most difficult to detect, primarily because of its tendency to fly directly and low over the water. This behavior was markedly

different from the vertical undulations we frequently observed in flying flocks of other sea ducks, including other eiders and the Oldsquaw. In addition, flocks of the most frequent sizes (one or two pairs) were more difficult to detect than larger flocks. Furthermore, additional eiders could have passed the cape outside of the 3-week sampling window because birds were still migrating on 15 May. Other birds may have migrated at night or even overland across the western Askinuk Mountains, east of our observation point. Still others may have migrated south past the cape but beyond the range of visual detection. Finally, if any birds were migrating directly from the wintering areas south of St. Lawrence to the Yukon–Kuskokwim delta, they would have reached the coast beyond our visual range well to the south of Cape Romanzof.

We can conclude that a significant percentage of the Spectacled Eiders breeding in the delta migrate south past Cape Romanzof. If the Spectacled is like the Common Eider, females rely heavily on stored energy reserves for egg production, then fast during laying and incubation (Parker and Holm 1990). If so, females should attempt to increase caloric intake and/or reduce caloric expenditure immediately prior to breeding. A direct flight from the wintering area to the breeding area might be part of the latter strategy. In 1997, Spectacled Eiders wintered at 62–63° N, to the southwest of St. Lawrence Island (Petersen et al. 1999). As noted previously, however, a straight flight from the wintering grounds to the breeding grounds in the Yukon–Kuskokwim delta would pass south of Cape Romanzof (Figure 1). Similarly, if migrant eiders were attempting to minimize the distance flown between the wintering grounds and the Alaska coastline before reorienting toward the breeding grounds, a direct flight to (but not north of) the cape is the shortest distance. Birds arriving at the cape from the north and northeast, however, were following neither of these routes.

Why, then, do Spectacled Eiders arrive at Cape Romanzof from the north? We consider two classes of hypotheses, accidental displacements and adaptive, if atypical, migrations. Perhaps most birds en route to the delta did fly directly to the breeding grounds. Under this scenario, the fraction of birds we detected at Cape Romanzof might have been displaced to the northeast of the regular migration route by orientation errors or spring winds. We cannot evaluate the efficacy of Spectacled Eider orientation directly, but the species' use of small traditional areas at sea during the nonbreeding season (Petersen et al. 1995, U.S. Fish and Wildlife Service 1996) and its tendency to return to specific nesting areas (Grand et al. 1998), even the immediate vicinity of former nests (C. L. Moran pers. comm.), suggest a capacity for very effective homing to final destinations. We do not know, however, whether such precise homing is a function of accurate orientation from point to point or the result of repeated adjustments en route. Displacement by winds seems unlikely because nearshore wind speeds and directions at Cape Romanzof in 1997 were not obviously correlated with either pulses or interruptions of eider migration (unpubl. data). We therefore do not believe that up to 25% of the delta's breeding population was accidentally displaced to the north of its traditional migration route.

Instead, we suspect that a prebreeding movement from the wintering grounds to still unknown areas in the northern Bering Sea is a regular part

of the annual cycle for Spectacled Eiders nesting in the Yukon–Kuskokwim delta. Such a movement could result from either a circuitous migration route or the use of a spring staging area. As the ice moves north in the spring, Spectacled Eiders departing from the wintering area southwest of St. Lawrence Island might follow the ice edge generally eastward until they hit shoreline leads or shorefast ice, then correct their flight direction by turning south to reach the delta. Ice edges might provide foraging opportunities or, if predictable from year to year, orientation cues. We consider this unlikely, however, for two reasons. Ice conditions in the northern Bering Sea at the time of spring migration in 1997 did not produce ice edges that would have guided the birds toward the delta's coastline (R. Page unpubl. data), and, more generally, the location of ice in the Bering Sea can be extremely variable over a range of temporal scales (Niebauer and Day 1989). Because of such variation, retreating ice edges are unlikely to provide reliable orientation cues from year to year.

Several species of sea ducks use spring staging areas in the Bering Sea (Larned 1998), and we suspect that Spectacled Eiders do as well. Over 300,000 Spectacled Eiders winter in the pack ice southwest of St. Lawrence Island (Petersen et al. 1999). For the vast majority of these birds, movement to a spring staging area in the northern Bering Sea would be en route to arctic breeding grounds in Russia or northern Alaska. Spectacled Eiders nesting in the Yukon–Kuskokwim delta, however, would be unique in flying north to a spring staging area (presumably with the rest of the global population), then returning south to breed.

Two areas in the Bering Sea north of St. Lawrence Island are occupied at other times of the year by Spectacled Eiders. Eastern Norton Sound and Mechigmenskiy Bay (Figure 1) are used during the postbreeding molt by the delta's females and males, respectively (Petersen et al. 1999). Further satellite telemetry, with longer-lasting transmitters, could confirm if prebreeding Spectacled Eiders stage to the north of their wintering area at these or other sites in the northern Bering Sea prior to spring arrival in the Yukon–Kuskokwim delta.

SUMMARY

From 25 April to 15 May 1997, we monitored the spring migration of Spectacled Eiders at Cape Romanzof, Alaska. We recorded 844 birds in 80 flocks as they migrated south past the cape en route to nesting habitat in the central Yukon–Kuskokwim delta. On the basis of systematic sampling, we estimate that 1327–1677 Spectacled Eiders passed south within 1.5 km of the cape during our study, 20–25% of the estimated breeding population in the delta. The birds' overall sex ratio, the sex ratio within individual flocks, and the alternation of males and females within flocks suggest that they were already paired when they passed Cape Romanzof. Because all of the eiders arrived from either the north or the northeast, we suspect that a spring staging area exists in the northern Bering Sea, north of the species' main wintering area, which lies to the southwest of St. Lawrence Island.

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NOTES

HEAD COLOR IN BRONZED COMMON GRACKLES, *QUISCALUS QUISCULA VERSICOLOR*

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In the Report of the California Bird Records Committee: 1995 Records (K. L. Garrett and D. S. Singer, *W. Birds* 29:133–156, 1998), a sight record of the Common Grackle (*Quiscalus quiscula*) from Bishop, Inyo County, 29 September 1993, was listed among "Records not accepted: Identification not established." The report stated that "Most members felt a Common Grackle was seen, but the head gloss was described as purple, a characteristic atypical for *Q. q. versicolor*, the only subspecies of the Common Grackle recorded in California. Although interpretation of color is subjective, the word 'blue' perhaps best describes the head gloss in *versicolor*." This is a misleading oversimplification.

The Carnegie Museum of Natural History has a large series of *Q. q. versicolor* in unworn plumage, mostly October, and mostly of specimens salvaged in Pittsburgh from poisoned migrating flocks. These were all preserved as study skins, specifically for study of individual variation. I examined 120 of these specimens (57 males, 63 females) to document head color. Although it is true that "interpretation of color is subjective," I had little difficulty in scoring head color into the following categories: green (G), blue-green (BG), blue-green with one or more areas purple (cheeks, forehead, throat) (BGP), blue (B), blue with one or more areas purple (BP), or purple (P). The series divided as follows:

Males: BP, 21; BGP, 11; P, 10; G, 9; BG, 6.
Females: BG, 24; G, 17; BP, 9; B, 8; P, 5.

Thus 24% of this series had head colors an unqualified "purple," and 65% had some areas of purple on the head that could be conspicuous, depending on the light and the angle.

Some of these grackles showed some evidence in their back color of introgression from the eastern Purple Grackle, *Q. q. stonei*, manifested by a varying extent of purplish iridescence anterior to the bronze of the back. However, an unpublished study of this series by Kristin Williams showed that there was no correlation between back color and head color.

It would appear that the description of the head gloss as "purple" was an insufficient cause to reject the Bishop record of a Common Grackle.

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ADDITIONAL RECORDS OF THE LEAST TERN FROM THE WEST COAST OF MEXICO

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Little is known of the distribution of the Least Tern (*Sterna antillarum*) along the Pacific coast of Mexico. It breeds locally (April–August) from northwestern Baja California and the northern Gulf of California south to Chiapas (Howell and Webb 1995, Thompson et al. 1997). From Nayarít south, it has been reported as a migrant (Schaldach 1963, Escalante 1988) or uncommon permanent resident (Alvarez del Toro 1980, Binford 1989, Villaseñor 1990, Thompson et al. 1997). These broad statements are based on relatively few specific observations.

On 23 March 1997 we observed four Least Terns an estimated 20–25 km off the coast of San Blas, Nayarít. Two individuals were flying west to southwest; another two were photographed roosting on the back of a Green Sea Turtle (*Chelonia mydas*). These could be wintering birds, spring migrants, or resident birds that breed at nearby colonies at Río Cuixmala and near Puerto Vallarta (Grant 1964, García and Ceballos 1995). The following winter, we saw two Least Terns on 10 January 1998 flying southwest, out to sea. The first was 20.5 km, the other 23 km off the coast of San Blas (20° 25′ 21.91″ N, 105° 27′ 12.58″ W and 20° 24′ 41.26″ N, 105° 29′ 08.98″ W).

Winter records of the Least Tern in Mexico are few. Along the Pacific coast, Howell and Webb (1995) reported the species to be an irregularly uncommon to rare winter visitor north to Nayarit on the basis of unpublished observations by Howell and Peter Pyle. Absent from recent reviews of this species' distribution are records from Christmas bird counts near San Blas, of two on 1 January 1977 (Am. Birds 31:623–624), 30 on 30 December 1983 (AB 38:819–820), one on 30 December 1984 (AB 39:815), three on 29 December 1985 (AB 40:1022–1023), and six on 28 December 1987 (AB 42:1147–1148). The only other specific published records are those of Massey (1981), who reported that Alan M. Craig found 75 "at an estuary in Colima, south of the city of Manzanillo" in the winter of 1979–1980 and that she saw 20-30 at three estuaries in Colima south of Manzanillo in January 1981.

There are few previous references to Least Terns occurring in the pelagic zone, but our observations suggest that the poorly known winter range and migratory routes of the Least Terns breeding in California and northwestern Mexico may be largely pelagic, accounting for the dearth of records away from the breeding range. Least Terns have been reported pelagically on few occasions, mostly during migration. Ridgely (1989) stated that near Panama these birds often migrate well offshore (>25 km). R. Rowlett (pers. comm.) observed Least Terns in the Gulf of Panama during the winter months working "school-fish" tuna schools with Black Terns (*Chlidonias niger*). On 1 May 1976 two Least Terns were reported resting on kelp 37 km off San Diego, California (Unitt 1984). Howell and Engel (1993) reported seeing Least Terns 2–30 km off the west coast of Baja California in late April and early May with flocks of other seabirds.

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BOOK REVIEW

The American Ornithologists' Union Check-list of North American Birds, 7th Edition. Am. Ornithol. Union, Washington, D.C. 1998. Hardback. Price $49.95 (plus $4.00 domestic, $10.50 Canada, and $7.00 other foreign, shipping and handling). ISBN 1-891276-00-X. Available from Max C. Thompson, assistant to the treasurer, Dept. of Biology, Southwestern College, 100 College Street, Winfield, KS 67156.

The passing of a generation can be marked by the appearance of a new *Check-list of North American Birds* from the American Ornithologists' Union. With each edition this venerable standard of taxonomy and nomenclature for birds on the North American continent becomes entrenched in the next several decades of publications, ranging from the technical literature to our favorite field guides. In this regard there are few, if any, publications in ornithology that have a greater impact on the field.

The sheer magnitude of this effort makes it difficult to draw comparisons with other work. Indeed, it seems comparable only with past editions of itself (especially, of course, A.O.U. 1983) and with such tomes as Sibley and Monroe (1990). The 7th edition is as successful as either in that it distills a staggering amount of information into something that is readily usable and even readable. For those unfamiliar with previous editions, the *Check-list* summarizes the distribution of all species recorded from North America, south to Panama and including the Caribbean and the Hawaiian Islands, i.e., a combined biogeographical and political area. Each account includes the scientific and English name of a species, the citation for its original description, a summary of its habitat, and a fairly lengthy account of its distribution, broken into breeding and winter ranges when relevant. An optional "Notes" section may discuss taxonomic matters. The 7th edition now includes a list of French names for all species but no Spanish names.

With but a single exception we find the 7th edition superior to its predecessor. Most importantly, the *Check-list* now includes a long overdue, reasonably comprehensive list of pertinent literature supporting taxonomic decisions and significant geographical records. Still, we were surprised that several important topical papers were omitted, e.g., the evidence for paraphyly of the Pelecaniformes by Hedges and Sibley (1994). The one exception concerns the hypothetical list, now consolidated into the sole appendix, comprising two parts: species reported with evidence insufficient for inclusion on the main list, and forms of doubtful status or hybrid origin. All references to hypothetical species have now been removed from the main text; in the 6th edition, species' names were placed [in brackets] within the appropriate family in the main text, a preferable approach.

Taxonomic treatments are generally consistent and well supported. Although the concept of "taxonomy by committee" has had its vocal detractors (e.g., Phillips 1986), in our view it is distinctly underrated. A primary reason that the *Check-list* is widely considered the standard of North American avifauna is precisely because no one taxonomic viewpoint is allowed to dominate. Instead, particularly with this edition, evidence for each treatment is weighed and a consensus is presented. Inconsistencies still slipped through, however. For example, compare the splitting of Scarlet-rumped Tanager into Passerini's Tanager (*Ramphocelus passerinii*) and Cherrie's Tanager (*P.* [*sic* = *R.*] *costaricensis*) on the basis of "new-school" genetic work (Hackett 1996) with the lumping of the Yellow-throated (*Atlapetes gutturalis*) and White-naped (*A. albinucha*) brush-finches on the basis of "old-school" taxonomy (Paynter 1975 [*sic* = 1978]). Surely a molecular/phylogenetic analysis of the brush-finches today would propose that *at least* two species be recognized.

Anyone working in systematics and taxonomy should recognize that as in any scientific endeavor the boundaries change with each new study, indeed, with each new tidbit of data. To that end it is arguably admirable that the 7th edition did not

attempt to pigeonhole certain groups, such as the becards, certain mourners, and sandgrouse. Instead, these taxa are placed *incertae sedis* in vicinity of their apparent closest relatives. Despite taxonomic uncertainty, however, we would have preferred it if a stand had been taken. The A.O.U. has never seemed particularly shy about upholding the *status quo* in the face of mounting but circumstantial evidence or about making a radical change with minimal information. Given that the *Check-list* is **the** standard for North American avifauna, its users will now find themselves at a loss over the familial placement of the becards, for example.

It would be impossible to please everybody at the level of the species. To be sure, the growing rift between advocates of the biological and phylogenetic species concepts has left a minefield that one must traverse in presenting a particular treatment. Much to the credit of the A.O.U., the biology of the organisms, not just their diagnosability, remains of paramount importance. Even so, published evidence available was weak at best for according some taxa the status of full species, e.g., Thayer's Gull (*Larus thayeri*), Tuxtla Quail-Dove (*Geotrygon carrikeri*), Island Scrub-Jay (*Aphelocoma insularis*). In other cases, evidence seems to support full species status, yet the taxa remain lumped, e.g., the Eastern (*Trochilus scitulus*) and Western streamertails (*T. polytmus*) and White-winged Junco (*Junco aikeni*). The Streamertail is a particularly odd example, as a note in that account makes it clear that eastern and western populations are highly differentiated by morphology, displays, and vocalizations and interbreed little. By contrast, taxa in the Variable Mountain-gem complex (*Lampornis castaneoventris sensu lato*) are less differentiated yet are accorded full species status.

Common names are generally satisfactory and reflect widespread usage. The tendency towards purging patronyms from North American bird names has thankfully passed, although we still await resurrection of "Coues' Flycatcher" (*Contopus pertinax*) or Sumichrast's Sparrow (*Aimophila sumichrasti*). There are but a few cases where inappropriate common names were chosen, e.g., the recently split Sharp-tailed Sparrows. Why were the new names not simply "Nelson's Sparrow" (*Ammodramus nelsoni*) and "Saltmarsh Sparrow" (*A. caudacutus*) instead of "Sharp-tailed" being retained in the name? We recognize the desire to make it clear that these sister species are both in the Sharp-tailed Sparrow complex, but common names were never meant to reflect systematic position or relatedness (nor should they be—that is in part the very reason we have scientific names). The piling on of "Nelson's" or "Saltmarsh" makes one think that they these names refer to *sub*species of the Sharp-tailed Sparrow, in the same sense that we refer to *Dendroica palmarum hypochrysea* as the Yellow Palm Warbler or *Zonotrichia leucophrys gambelii* as Gambel's White-crowned Sparrow. We sincerely hope that the common names for the Sharp-tailed Sparrows are changed, or at the least this convention does not become a trend. After all, the A.O.U. purged clunky names like "Black-backed Three-toed Woodpecker" for a reason.

Another problem with common names concerns the splitting of widespread taxa with a single established name. In some cases the widespread name has been maintained when the taxon was split (e.g., Western and Clark's grebes). This practice may be acceptable, particularly in cases where one taxon is uncommon and localized, primarily because it is best to maintain names in widespread usage. Such cases appear not to have been thought out with a view to consistency, however. We note that *Corvus imparatus* has (finally) been renamed the Tamaulipas Crow, rather than the less appropriate Mexican Crow. But then Band-tailed Gull was retained for *Larus belcheri*, when the name Belcher's Gull is used widely; this latter choice would alleviate potential confusion between the Band-tailed and Black-tailed (*L. crassirostris*) gulls. And that decision seems at odds with the introduction of "Eastern Towhee" for the *Pipilo erythrophthalmus* complex of eastern North America. Whereas the name is hardly inaccurate, the name "Rufous-sided Towhee" has a long history for that complex and was established well before the *P. maculatus* (Spotted Towhee) complex was lumped with it in the 1950s.

One of the great strengths of the 7th edition is the practice of noting separately the distributions of strongly differentiated subspecies or subspecies groups, typically accompanied by a short explanation of different taxonomic treatments that these groups receive elsewhere. There are, however, some glaring exceptions. Within the genus *Branta* one finds the usual between-group distinctions made for the Brant. By contrast, despite a thoughtful discussion in the note of potential species-level differences between the large (*B. c. canadensis* group) and small (*B. c. hutchinsii* group) Canada Geese, no distinction is made between their distributions in the actual species account. As a minor aside, note that the discussion of subspecies distributions for the Black Scoter is partly in error, as it is not *nigra* that "summers widely from southern Yukon and southern MacKenzie east to Labrador and Newfoundland." We found a few instances where a taxonomic note was needed but lacking. Perhaps most sorely missed was a comment about Heuglin's Gull (*Larus heuglini*) in the account of the Lesser Black-backed Gull (*L. fuscus*). Heuglin's Gull (comprising *L. h. heuglini* and *L. h. taimyrensis*) is increasingly treated as a distinct species (e.g., Kennerley et al. 1995), though also frequently treated as conspecific with *L. fuscus* (e.g., Cramp and Simmons 1983). Failure to mention the Masked Bobwhite (*Colinus virginianus ridgwayi*) is also surprising.

Range descriptions in the 7th edition are on the whole more accurate and consistent than in any previous edition, although seabirds seem to have been given less attention than other groups, e.g., the Light-mantled Albatross (*Phoebetria palpebrata*) does not breed on Amsterdam and St. Paul islands. We have a distinct bias, yet find the effort made by the A.O.U. to enlist the help of state and regional reviewers to be a worthwhile undertaking, and one that we hope will continue. This pool of expertise helped ensure that the number of errors in distributional accounts was at a minimum and that records of regional import were likely to be included. Yes, a number of records of rarities were missed, but the number must be far fewer than those included. In so daunting a task, it is not surprising that the reported level of documentation for certain records was erroneous. For example, more than a sight record, the Gray Wagtail (*Motacilla cinerea*) in California was extensively photographed, as was at least one Black Vulture in New Mexico, Red-necked Stint in Nevada, Cayenne Tern in North Carolina, etc. Still, such information about single records is trivial in the bigger picture. Slightly more surprising is the rare *lapsus* in an account. For example, the Forster's Tern occurs "south locally to South Carolina and, formerly, South Carolina." The Great Frigatebird is "not certainly recorded (sight reports only) from the Pacific coast of North or South America," yet the photographic record from California is listed. The Black Rail is somehow a breeder along the lower Colorado River *and* accidental in Arizona. At the same time, we note that information provided by regional reviewers was incorporated into some species accounts but not others. We suggest it would be useful if the A.O.U. maintained a file of unpublished records so that apparently novel records noted in the *Check-list* could be tracked down easily, rather than seeming to have no basis and thus be condemned in subsequent works.

A few accounts simply lack information. Why is there no mention of the American Golden-Plover occasionally wintering in North America (Paulson and Lee 1992)? How is it that winter records for Arizona of the Flammulated Owl were missed? In other cases we question the status given, e.g., neither the White-eared (*Hylocharis leucotis*) nor Berylline (*Amazilia beryllina*) hummingbird is resident in Arizona—indeed, both are quite rare there—or the status was not made clear enough, e.g., the Trumpeter Swan (*Cygnus buccinator*) winters only casually from California east through Texas. The use of the status terms "casual" and "accidental" is as consistent as we have seen anywhere, although we wonder why the Yellow-legged Gull (*Larus cachinnans*) is casual in Maryland and the District of Columbia but accidental in Quebec and Newfoundland.

Habitat descriptions are succinct and generally sufficient, but we would have preferred it if an elevational range had been provided for all species, not just tropical

ones. Also, it could be made clear whether these elevations are minima and maxima or represent the typical distribution of the species. In some cases an elevational range is slightly off, e.g., the Crested Guan (*Penelope purpurascens*) occurs up to 2500 m in western Mexico, but usually they are accurate and help provide a better idea about the ecological distribution of a species.

Our final point is best considered a recommendation. We applaud the decision to flag extinct species (with a dagger, †), but wish that nonnative taxa had been flagged too. Given the extraordinary interest in biodiversity in this age of conservation biology, we need to recognize that nonnative taxa simply "do not count." It is impossible to determine in some cases where the native range ends and the nonnative one begins. For example, it is not clear that all populations of the "Wild" Turkey (*Meleagris gallopavo*) have been introduced into California and that only those in southern Arizona are native to that state. If not placed in a different section, the non-native range/status should be described separately (as done with infraspecific groups), and taxa completely nonnative to North America could have a different typeface, as in Hickman (1993) for plants.

In sum, however, any superlative we could summon would be insufficient to praise this fine effort properly. The mountains of data summarized are not without occasional error, but that does not detract from the utility or quality of this volume. That the A.O.U. committee was able to accomplish this task in the wake of Burt Monroe's untimely passing bears witness to its commitment to produce the finest standard possible on North American bird taxonomy and distribution. No birder, ornithologist, or indeed anyone working in conservation biology should be without this volume on his or her shelf.

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Michael A. Patten and Steve N. G. Howell

FEATURED PHOTO

MOLTS BY AGE IN THE BRISTLE-THIGHED CURLEW AND OTHER SHOREBIRDS

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Prior to the 1970s, molt and its effect on age determination in birds, especially in the field, was not a thoroughly worked topic in ornithology. This changed somewhat in 1977, when A. J. Prater, J. H. Marchant, and J. Vuorinen published their *Guide to the Identification and Ageing of Holarctic Waders*. Field ornithologists began to pay more attention to the age of their subjects as it relates to accurate species identification within certain shorebird genera (e.g., *Calidris*; Veit and Jonsson 1984), and an entirely new era in field ornithology arose. The accurate determination of age in the field, in turn, depends on a critical understanding of the timing, location, and variation in the extent of molt in these species.

Although the determination of molt-related age characters in the field began with the shorebirds, progress within this group has been modest at best (at least for North American species), and many questions remain. In numerous shorebird species, juveniles that winter south of the equator replace a variable number of outer primaries during a protracted first prebasic molt, while juveniles of the same species wintering north of the equator retain all of their juvenal primaries during a curtailed version of this molt. The details of this variation, at least in North American species such as the Wandering Tattler (*Heteroscelus incanus*), Least Sandpiper (*Calidris minutilla*), and potentially many others for which no data exist at all, have yet to be worked out. For example, does the number of dropped primaries in these species vary clinally with latitude or do distinct populations exist in which first-year birds either do or do not drop primaries? The latter situation has been used as support for ranking the golden plovers as species (Johnson 1985), but more data are needed from other genera to reveal the extent to which genetic versus environmental factors control this molt.

Oddly enough, one of the best-studied North American shorebirds in terms of molt is one of the rarest: the Bristle-thighed Curlew (*Numenius tahitiensis*). Jeffrey S. Marks (1993) studied molt in banded birds of known age for a cumulative 13 months over four years (1988–1991) on Laysan in the northwestern Hawaiian Islands, where wintering curlews typically perform all of their molting. Marks observed many interesting and previously unreported aspects of shorebird molt; some of these may reflect unique life-history traits of the Bristle-thighed Curlew, while others may be common to other large shorebirds but remain undocumented.

Marks found that immature Bristle-thighed Curlews do not replace their juvenal primaries until March through September of their second calendar year. The bird shown on the back cover, photographed on Midway Atoll on 5 June 1998, is undergoing this molt, having replaced the innermost four primaries, with the fifth incompletely grown. This molt often includes all of the primaries, but sometimes (perhaps in years of poor food supply only) the outermost primaries can be retained. Remarkably, from July through November or later, these second-year birds undergo a second wave of primary replacement, in many cases commencing before completion of the first wave, thus involving primaries that are no more than a few months old. This summer/fall molt appears to be incomplete in a large proportion of second-year birds but complete in third-year and older birds, which lack the earlier spring/summer replacement. Thus, many birds in their second basic plumage (between their second and third years) can be reliably distinguished by having two or three generations of primaries. For many (but not all) adults, the complete prebasic molt of remiges occurs

in blocks, rendering the birds flightless for up to two weeks or more. Finally, adult curlews also undergo a partial prealternate molt (body feathers) in the winter and spring; the extent of this molt in second-year and third-year birds remains unknown.

Because molt is such an energy-consuming process, why would second-year curlews replace their inner primaries twice during summer and fall? Part of the answer undoubtedly relates to Bristle-thighed Curlews' remaining on the winter grounds for their first two to four years of life (Marks and Redmond 1996). Upon their arrival in late summer and fall the inexperienced juvenile curlews must learn to forage for the relatively limited but consistent food resources of tropical atolls. This likely takes up much of their energy reserves, and since they will not be migrating the following year, molt of primaries is delayed until the next spring and summer, when adults are on the breeding grounds and competition for food is reduced. By this time intense insolation has likely taken its toll on the primaries, necessitating gradual replacement (see photo) in order for the birds to fly and forage in late summer and fall. The second wave represents a partial conversion toward the typical adult pattern, in which primaries are completely replaced each fall upon return to the wintering grounds. Presumably, second-year birds can afford this extra replacement because of reduced competition for food while older birds are breeding, increased foraging experience, the lack of exhausting migrations and breeding, and their remaining capable of flight during late summer when many adults become flightless. On the other hand, if sufficient resources are not available (as often seems the case), primary replacement in second-year birds is arrested before it is complete.

The interesting patterns of primary molt in immature Bristle-thighed Curlews thus result from the life-history traits of the species, as dictated by many circumstances (steady but limited food resources, intense solar radiation, lack of predators) that other shorebirds may not encounter. This and the intraspecific variation in primary molt by latitude noted above might suggest that environmental rather than genetic factors are more responsible for these patterns of molt, but comparison with related species is needed to test this hypothesis. Some evidence (Prater et al. 1977, Cramp 1983) suggests that the feather-replacement strategy of immature Whimbrels (*Numenius phaeopus*) may be similar, but despite the Whimbrel's being widespread and abundant, studies such as that on the Bristle-thighed Curlew (Marks 1993) have not been undertaken.

Two other aspects of molt, illustrated in the featured photo and not covered by Marks (1993), are worth mentioning. First, note that the greater primary coverts are being replaced along with their corresponding primaries. This pattern is normal in many birds with first prebasic primary molts that follow the typical sequence (proceeding distally from the innermost primary) but not in species with eccentric patterns, in which flight-feather molt proceeds distally from a primary other than the innermost (Pyle 1997). It would be interesting to know whether those shorebird species with eccentric first prebasic molts south of the equator concurrently replace the greater primary coverts. Replacement patterns of the greater primary coverts are rarely documented in studies on molt (e.g., Prater et al. 1977, Cramp 1983) despite the importance of this feather tract to accurate age determination (Pyle 1997). Second, note that the first prebasic molt commenced with the scapulars, inner lesser coverts, and median coverts, with the outer lesser coverts, most or all greater coverts (dropped or hidden below the median coverts), and secondaries yet to be renewed. This sequence (commencing with the median coverts) is common in the Charadriiformes (shorebirds, gulls, terns, alcids) and is easily viewed in the field.

Slowly but surely, our knowledge of molts in North American birds is improving. For passerines and other landbirds, this knowledge has been gained largely through banding data and examination of museum specimens. Because of the larger size, fewer captures, and fewer specimens of many waterbirds, however, a complete knowledge of the timing, extent, and location of their molts by age will be more

difficult to obtain. The next step with these species is detailed studies of molt in the field, as have been initiated among the pelicans (Schreiber et al. 1989), ducks (Cooke et al. 1997), and gulls (Howell et al. in press). I suggest that the next challenge for astute field ornithologists is determining molt patterns and their relationship with age in common shorebirds (e.g., the Whimbrel) and other large waterbirds. The answers may require only a little background knowledge, a cooperative flock of birds, patience, and a good telescope.

Comments by Jeffrey S. Marks, Steve N. G. Howell, and Robert A. Hamilton improved the manuscript. This is contribution 748 of the Point Reyes Bird Observatory.

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CORRIGENDUM

The legend for Figure 2 in "First Record of a *Cuculus* Cuckoo on Midway Atoll and the Hawaiian Islands" by Pyle and Nestler (W. Birds 29:124–127, 1998) was confused. The correct legend should be as follows: Specimens of *Cuculus canorus canorus* (left two birds), *C. c. telephonus* (center two birds), and *C. saturatus* (right two birds). In each case the specimen (of those at MVZ; see text) with the boldest barring is on the left, and the specimen with the sparsest barring is on the right. Descriptions of the bird from Midway matched the paler specimen of *telephonus* (third specimen from the right). From left to right, MVZ 101637 (collected 12 May), 109077 (2 July), 143575 (17 September), 130838 (23 May), 134619 (19 May), and 140272 (16 May).

Hooded Merganser

Sketch by Cin-Ty Lee

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Cover photo by © Peter LaTourrette of Los Altos, California: Island Scrub-Jay *(Aphelocoma insularis)*, Santa Cruz Island, California, September, 1996.

Western Birds solicits papers that are both useful to and understandable by amateur field ornithologists and also contribute significantly to scientific literature. The journal welcomes contributions from both professionals and amateurs. Appropriate topics include distribution, migration, status, identification, geographic variation, conservation, behavior, ecology, population dynamics, habitat requirements, the effects of pollution, and techniques for censusing, sound recording, and photographing birds in the field. Papers of general interest will be considered regardless of their geographic origin, but particularly desired are reports of studies done in or bearing on the Rocky Mountain and Pacific states and provinces, including Alaska and Hawaii, western Texas, northwestern Mexico, and the northeastern Pacific Ocean.

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WESTERN BIRDS

Volume 30, Number 4, 1999

SEABIRDS CARRIED INLAND BY TROPICAL STORM NORA

ROY M. JONES, 2237 North Sunset Drive, Tempe, Arizona 85281

Every year about 15 cyclones form off the southwest coast of Mexico or regenerate there from Caribbean storms that have crossed Central America; about half of these become hurricanes. Prior to the 1970s, these storms were thought to have no effect on weather in the United States. Court (1980) brought a new perspective to eastern Pacific cyclones when he showed that 40 storms occurring between 1904 and 1980 had affected the western United States.

It should surprise no one then that with so few tropical storms reaching North America from the Pacific much is left to be learned about their effects on birds and the potential for unusual displacements, especially of coastal and pelagic species inland. In 1976, Tropical Storm Kathleen gave ornithologists a glimpse of such effects when it stranded hundreds of seabirds in the desert southwest, primarily at the Salton Sea (Kaufman 1977, McCaskie 1977). Tropical Storm Nora provided another opportunity for study with an unprecedented number of seabirds found in Arizona along the Colorado River and, to a lesser degree, at the Salton Sea.

TROPICAL STORM NORA

Nora formed late on 15 September 1997, roughly 480 km southwest of Acapulco in a large area of disturbed weather that was likely related to a tropical wave (a disturbance or trough of low pressure that moves from east to west through the tropics, generally creating only a shift in winds and rain but often associated with with the development of cyclones) that crossed from Africa into the Atlantic hurricane basin in late August. The southern part of this wave crossed the Caribbean Sea and northern South America, arriving in the eastern Pacific 12 September. Nora reached tropical storm status on 16 September and became a hurricane with a large ill-defined eye on 18 September. Traveling parallel to the west coast of Mexico, the hurricane passed over the Revillagigedo Islands with a very broad eye (92 km

wide) on 22 September. Moving west of Baja California, Nora came under the effects of a low-pressure trough to the northwest, which steered it northward. Nora made a direct hit on Punta Eugenia, Baja California Sur, 24 September and brought floodwaters to its second landfall about 95 km south of San Fernando, forcing 350 to 400 people from their homes (Rappaport 1997).

Accelerating overland, Nora crossed the Baja California peninsula, skirted the western shoreline of the Gulf of California and entered the United States, as a tropical storm, along the Arizona–California border. Further weakening ensued, and by 1700 on 25 September Nora was a tropical depression near Rice Valley, California, with winds of 48 km/hr. Yuma received a peak wind gust of 75 km/hr and 8.9 cm of rain. The storm dissipated over the next two days while moving northeastward through Arizona, Utah, Colorado, Idaho, and Wyoming (Rappaport 1997).

For birders, the timing of the storm as it hit the Lower Colorado River valley was rather unfortunate, allowing only a few hours for looking for birds before darkness fell. Interestingly, though, during the height of the wind (56 to 72 km/hr) gulls and terns at Lake Havasu were unfazed. They were actively feeding over the water, fighting and chasing each other vigorously for food that had either welled up from lower depths or was swept down with the runoff from higher ground.

Following the storm on the morning of 26 September birders were out in force; Arizona and southern California were well covered, and, once word got out of the storm-petrels at Lake Havasu and the Salton Sea, people continued reporting for weeks. Observers as far away from the storm track as Willcox and Picacho Reservoir in eastern and central Arizona reported their sightings; they had anticipated the possibility of unusual birds. This level of reporting contributed greater detail on the activities of storm-driven birds than was provided in the early days after Kathleen, which flooded and washed out many access roads.

BIRDS ASSOCIATED WITH NORA

At the north end of Lake Havasu, Mohave Co., Steve Ganley, Charles Babbitt, and I observed an apparent Black-vented Shearwater (*Puffinus opisthomelas*) on 26 September. Jim Burns and Bud Johnson saw two following a boat the next day at the same location. The original written descriptions are on file with the Arizona Bird Committee at the University of Arizona bird collection (no photograph was taken nor specimen collected). Only one shearwater had been seen in Arizona prior to Nora, a Sooty Shearwater (*Puffinus griseus*) found dead near Wellton, Yuma Co., on 6 June 1971 (Quigley 1973, Univ. Ariz. 10316). Inland southern California records include a Wedge-tailed Shearwater (*Puffinus pacificus*) at the Salton Sea, Riverside Co., 31 July 1988 (McCaskie and Webster 1990) and a Buller's Shearwater (*Puffinus bulleri*) at the same location on 6 August 1966 (Audubon Field Notes 20:599, specimen in the San Bernardino County Museum). There have also been eight records of the Sooty Shearwater from Imperial and Riverside counties, all between April and August (Patten and Minnich 1997). None of the region's previous records are

thought to be storm related (Patten and Minnich 1997). The Black-vented and Sooty are the most common shearwaters of the northern gulf, and it seems reasonable to infer that the Lake Havasu birds came from there. However remote the chance that a bird could survive in the eye long enough to make a trip from Revillagigedo Islands, it may be difficult to rule out Townsend's Shearwater (*Puffinus auricularis auricularis*) entirely.

Two birds reported as Leach's Storm-Petrels (*Oceanodroma leucorhoa*), one dark-rumped and one white-rumped, were briefly observed by Bill Howe at the north end of Lake Havasu on 26 September. The original written description is on file at the University of Arizona. There are no accepted records for Arizona. In southern California, Kathleen was responsible for a dark-rumped individual at the Salton Sea on 15 September 1976 (McCaskie 1977), and a white-rumped individual was at the mouth of the Whitewater River 30 June–21 July 1984 (McCaskie 1984).

Approximately 40 Black Storm-Petrels (*Oceanodroma melania*) were seen and photographed at Lake Havasu on 26 and 27 September (Figure 1). Reports were from the mouth of Bill Williams delta, Takeoff Point, Cattail Cove, the north end, and from the California side in San Bernardino Co. (many observers). The last report was of eight birds on 30 September by E. A. Cardiff and Dori Myers. At the south end of the Salton Sea, J. Coatsworth reported three or four birds on 27 September. The number there fluctuated with a high of 17 on 11 October (M. A. Patten). The last report was on 9 November (H. King). There were no previous records for Arizona. Inland records in southern California are from the north end of the Salton Sea, Riverside Co., 21 September 1986 (McCaskie 1987) and King's Canyon National Park, Tulare Co., 5 October 1994 (Yee et al. 1995). Although the

Figure 1. Black Storm-Petrels, Lake Havasu, 26 September 1997.

Photo by William Grossi

bird at the Salton Sea was not storm related, the one at King's Canyon was thought to be associated with a nontropical Pacific storm.

Between 100 and 200 Least Storm-Petrels (*Oceanodroma microsoma*) were seen and photographed at Lake Havasu on 26 September (many observers). The number went down to 40 to 60 the next day, and from 28 September to 1 October only one to six birds were reported. The birds were seen at the mouth of the Bill Williams delta, Takeoff Point, Cattail Cove, the north end, and from San Bernardino Co. in California. Two dead Least Storm-Petrels were picked up at Lake Havasu, one 26 September (C. Tomoff, Univ. Ariz. 17724; Figure 2), the other 3 October (D. Stejskal, Univ. Ariz. 17817). At the south end of the Salton Sea three birds were found 27 September (D. K. Adams), with one still present 20 October (G. McCaskie). Kathleen brought three individuals to Arizona, two at Lake Mohave, Mohave Co., 12 September 1976 and one at Davies Dam, Mohave Co., 17 September 1976 (Monson and Phillips 1981). The only other Arizona record, related to the remnants of Hurricane Lester, is of a bird at Patagonia Lake, Santa Cruz Co., 24 August–5 September 1992 (Rosenberg and Stejskal 1993). In California, Kathleen brought 500–1000 birds to the Salton Sea (McCaskie 1977). Another was found at the Whitewater River delta 10 July 1993, the only interior California record not associated with Kathleen or Nora (Patten and Minnich 1997).

Black and Least storm-petrels are common in both the northern gulf and along the northern end of Nora's track in the Pacific, making their origin

Figure 2. Least Storm-Petrel, Lake Havasu, 26 September 1997.

Photo by Troy Corman

difficult to assess. The mountains of Baja California, however, should have blocked the arrival of a large number of birds at Lake Havasu from the Pacific. It seems more plausible that the majority of Nora's storm-petrels (including Leach's) were swept into the storm from the gulf. Some of the storm-petrel reports from the Salton Sea were probably of birds from Lake Havasu that had found their way to this inland sea rather than to the gulf (McCaskie 1998). Some storm-petrels at Lake Havasu on 26 September were reported as weak and tired while many others appeared to be fine. One observer commented that some probably did not survive for too long after they were seen.

An adult Red-billed Tropicbird (*Phaethon aethereus*) was found by Pamela Beare in Imperial County, California, on 27 September. The bird was picked up on Highway 78 between Palo Verde and Midway Well and taken to Sea World, where it died later that day (San Diego Natural History Museum 49913). A Kathleen-related bird in Morongo Valley on 11 September 1976 (McCaskie 1977, San Bernardino County Museum) provides the only other inland record for southern California. Arizona has six tropicbird records; only one, the state's lone White-tailed Tropicbird (*Phaethon lepturus*), was storm related. It was picked up in Scottsdale, Maricopa Co., 22 August 1980 (Monson and Phillips 1981, Smithsonian) and was thought to be associated with a tropical depression that moved into the state from the Gulf of Mexico.

Lin Piest saw 21 frigatebirds ahead of the storm at Telegraph Pass east of Yuma, Yuma Co., on 25 September. It is very likely these birds were all Magnificent Frigatebirds (*Fregata magnificens*), common in the northern Gulf of California. With no physical documentation, however, ruling out the Great Frigatebird (*Fregata minor*) entirely may be difficult. Aside from a flock of 22 at the north end of the Salton Sea in 1979, those at Telegraph Pass represent the largest flock for the interior southwest (Patten 1998, Mlodinow 1998) and by far the highest number ever for Arizona.

An immature Blue-footed Booby (*Sula nebouxii*) at the north end of the Salton Sea 28 September–6 October may have been storm related, but this species wanders north from the gulf sporadically at this time of the year (McCaskie 1970, Garrett and Dunn 1981). In Arizona, there are 12 accepted records (Monson and Phillips 1981, Rosenberg and Witzeman 1998) from the central and western parts of the state, all of birds that wandered from the gulf in fall.

Two Least Terns (*Sterna antillarum*) were seen on 26 September, one at Lake Havasu (W. Grossi), the other at the Ajo sewage ponds, Maricopa Co. (D. Tiller). This species has been seen in Arizona in increasing frequency the past several years, primarily as a late spring or early summer visitor (Rosenberg and Witzeman 1998). At the Salton Sea, it is regular in small numbers from late April through mid-July. The late date of those seen 26 September 1997 seems to support their association with Nora.

A Black Skimmer (*Rynchops niger*) was seen at Lake Havasu on 26 and 28 September (B. Raulston, J. Burns). There are fewer than 10 Arizona records (Rosenberg and Witzeman 1998). At the Salton Sea hundreds of pairs nest annually. Because Nora's track probably would have blocked a bird from wandering to Lake Havasu from the Salton Sea, it is likely this bird was driven from the gulf.

I saw two Sabine's Gulls (*Xema sabini*) during the storm from Kiwanis Park at Lake Havasu on 25 September and counted eight at the north end of Lake Havasu the following day, the largest concentration ever reported in Arizona. Sabine's Gulls were reported through 28 September. At both the Salton Sea and in Arizona, this species is found in very small numbers during fall migration. Therefore, the high number of individuals involved makes it more likely the birds were carried north from the gulf rather than slowed on their southward migration.

Charles Babbitt, Steve Ganley, and I noted two Parasitic Jaegers (*Stercorarius parasiticus*), one immature and one adult, at the north end of Lake Havasu on 26 September. There are five accepted records for Arizona (Rosenberg and Witzeman 1998). These birds could have been carried north from the gulf, where they are probably common at this time of year, or they may have been moving southward during their normal migration.

DISCUSSION

Most of what is known about bird movements and tropical storms has been learned from cyclones in the Atlantic, Caribbean, and Gulf of Mexico. The most powerful of these storms has stranded birds more than 1600 km from their normal range and as far north as Nova Scotia and Newfoundland. These storms are also notorious for transporting otherwise strictly pelagic species great distances inland, sometimes over obstacles like the Appalachian Mountains. With satellite imagery and advanced warning systems, birders in the eastern U.S. are able to anticipate with surprising accuracy the times and places where one might find birds following such storms (Kaufman 1977, Elkins 1988, Brinkley 1997, 1999).

When pelagic birds were carried inland by Kathleen the question was whether they were brought ashore from the Pacific by the relative calm in the eye or from the gulf by the winds contained in the outer bands of the storm, rotating counterclockwise (Kaufman 1977). With birders providing early post-storm reports from many locations in Arizona, some ideas of how Nora brought seabirds ashore can be formed. Because the low-pressure center passed just west and north of Lake Havasu, where the largest concentration was found, the birds were likely brought ashore in the eye. If the outer winds had been more important birds would be expected all over western Arizona where the winds were the strongest and not in a single location so close to the storm track. Places like Painted Rock Reservoir to the south and lakes Mohave and Mead to the north were checked but no storm-driven birds were found. Another point is the relatively moderate wind speed of the storm once it entered the U.S. (56 to 72 km/hr). It seems unlikely that these winds alone were powerful enough to force a large number of birds such a distance inland.

The final fate of these birds is open to debate. Many people feel that they perished over land, at Lake Havasu, or at the Salton Sea, unable to find their way to the gulf. The two dead storm-petrels at Lake Havasu, the tropicbird in California, and reports of weak and tired birds after the storm support this hypothesis. It is possible, though, that many of these birds survived. In 1968, Hurricane Gladys transported tens of thousands of Laughing Gulls and Black

Skimmers some 1900 km from their normal range; it was thought that the majority of these birds returned south (Elkins 1988). Nora transported birds roughly 300 km. At Lake Havasu the seabirds dispersed within days. The number of Least Storm-Petrels in particular went down more than 50% after the first day, and within three days the number of all storm-petrels was less than 10% of what it was immediately after the storm. This rapid departure would give the birds the best chance of finding their way to the gulf. If some of the birds at the Salton Sea found their way from Lake Havasu then clearly they could find their way across the desert. In addition, the small number of dead storm-petrels found seems low for any mass die-off, especially when the number of birders in the field after the storm is considered.

SUMMARY

Tropical Storm Nora gave ornithologists the opportunity to study the effects that Pacific cyclones have on seabirds and their movements. This storm brought hundreds of storm-petrels and other pelagic species inland to Arizona and California. It can safely be assumed that cyclones from the eastern Pacific or the Gulf of California will transport pelagic species inland, sometimes great distances. Birders can add significantly to our knowledge of the effects these storms have on birds by visiting bodies of water along the path of the storm's center as quickly as possible after the storm's passage and reporting their discoveries immediately.

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RECENT CHANGES IN THE WINTER DISTRIBUTION AND ABUNDANCE OF ROCK SANDPIPERS IN NORTH AMERICA

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The North American population of the Rock Sandpiper (*Calidris ptilocnemis*) winters along the Pacific coast from the Bering Sea to northern California (AOU 1998). In Alaska, where it is the most abundant winter resident shorebird (Gill and Tibbitts 1999), the species uses substrates of soft or coarse sediment (Gill and Tibbitts 1999), whereas rocky shorelines are the primary habitat in the southern part of its range (Paulson 1993). Rock Sandpipers are rarely encountered away from the coast (Campbell et al. 1990). Perhaps because of their close association with rugged or isolated coasts, little is known about their winter population status.

Paulson (1993) suggested that winter populations have declined in the Pacific Northwest but was uncertain whether the apparent decline is limited to that region or reflects a more widespread change in population abundance. In this paper, I use data from annual Christmas Bird Counts (CBC) throughout the winter range of the Rock Sandpiper to assess the winter population status of this species.

METHODS

To evaluate recent trends in winter populations of Rock Sandpipers, I tallied results from CBCs conducted in Alaska (9 count sites), British Columbia (6 sites), Washington (4 sites), Oregon (6 sites), and California (5 sites) where Rock Sandpipers have been detected on at least 10% of the counts since 1968–69 (see below and Table 1). The CBC is an annual single-day event involving volunteers who count as many birds as they can within a 12-km radius circle (see Bock and Root [1981] for additional details about the CBC).

A number of researchers have suggested methods for standardizing CBC data prior to analysis (e.g., Bock and Root 1981). Standardization of count data is an important consideration for many species because the level of observer effort may be correlated with a species' abundance (Bock and Root 1981). In this analysis, however, I used the actual count data rather than an index value (i.e., birds/party hour) because I found no positive relationships between observer effort and the abundance of Rock Sandpipers (Spearman rank correlation; $r_s < 0.26$, $P > 0.25$ in all cases).

I originally intended to use regression analysis (Neter et al. 1990) to assess relationships between abundance of Rock Sandpipers and year of count. In many cases, however, I was unable to perform adequate data transformations (to normalize data distributions) because of high variability in the counts, particularly from Alaska, where Rock Sandpiper abundance may change as birds move within or among estuaries (Gill and Tibbitts 1999).

Table 1 Numbers of Rock Sandpipers Recorded on Christmas Bird Counts[a]

	Before 1982–83			After 1982–83					
Site	Mean	SE[b]	*n*[c]	Mean	SE	*n*	Trend	*t*	*P*
Alaska									
Adak	—	—	—	88.82	(24.86)	11	*d*	*d*	*d*
Cordova	71.33	(29.53)	12	45.67	(32.99)	12	=	1.72	>0.25
Homer	463.70	(200.92)	10	1045.36	(293.29)	14	+	1.82	<0.05
Glacier Bay	376.36	(66.91)	11	735.50	(179.03)	10	+	1.95	<0.05
Juneau	209.88	(92.59)	8	107.36	(38.42)	14	=	1.73	>0.10
Kodiak	178.00	(50.38)	9	83.93	(15.26)	14	–	2.13	<0.025
Narrow Cape	36.00	—	1	32.07	(10.10)	14	*d*	*d*	*d*
Sitka	6.83	(5.55)	6	12.21	(8.52)	14	=	0.39	>0.25
Valdez	133.33	(133.33)	3	176.00	(96.24)	12	*d*	*d*	*d*
British Columbia									
Masset	—	—	—	15.50	(13.66)	14	*d*	*d*	*d*
Nanaimo	0.18	(0.18)	11	4.29	(1.57)	14	+	1.71	<0.025
Skidegate	—	—	—	39.43	(12.91)	14	*d*	*d*	*d*
Sooke	—	—	—	3.17	(1.29)	12	*d*	*d*	*d*
Sunshine	17.67	(17.17)	3	15.54	(3.83)	13	*d*	*d*	*d*
Victoria	19.07	(5.10)	14	5.43	(1.68)	14	–	4.75	<0.0005
Washington									
Grays Harbor	27.30	(4.63)	10	5.92	(1.46)	12	–	4.75	<0.0005
Oregon									
Coos Bay	5.13	(1.87)	8	1.55	(0.69)	11	–	2.01	<0.05
Tillamook	12.21	(2.23)	14	3.57	(1.11)	14	–	3.47	<0.001
Yaquina	7.33	(2.65)	9	0.93	(0.34)	14	–	2.99	<0.005

[a]Mean values before and after 1983 compared with two-sample *t* test. Counts with fewer than three Rock Sandpipers per year not included.

[b]SE, standard error.

[c]*n*, number of years a CBC was conducted.

[d]Data insufficient for two-sample analysis.

While visually inspecting scatter plots of the count data I noted a regionwide pattern of population change in the early to mid-1980s (Figure 1). Because of the timing and range of the pattern I suspected a relationship to the 1982–83 El Niño–Southern Oscillation event. Consequently, I used a one-tailed two-sample *t* test at each site to determine whether counts between 1968–69 and 1981–82 were greater than those between 1983–84 and 1996–97, using data from only those circles where counts were made in >75% of the years between 1968 and 1997. In addition, I used regression analysis for Narrow Cape/Kalsin Bay (Alaska) and Skidegate (British Columbia) data because either $\log_{10}$ or polynomial transformations were possible and the number of years with CBC data prior to 1982–83 was too small for a two-sample analysis; these two regression analyses covered periods ending in 1996–97 and beginning in 1981–82 and 1983–84, respectively.

RESULTS

Rock Sandpipers were recorded regularly in 19 CBC circles, throughout most of their winter distribution (Table 1). Wintering Rock Sandpipers reached their greatest abundance in three count circles in Alaska: Homer (high of 3400 in 1995–96; six counts >1000), Glacier Bay (1708 in 1987–88; three counts >1000), and Valdez (1100 in 1989–90). Their abundance varied substantially from year to year in these and other count circles, particularly in Alaska. Rock Sandpipers occurred in lower numbers in all other count circles; their scarcity in many circles in Washington (i.e., Bellingham, Seattle, San Juan Islands Archipelago; all means <1.0/year), Oregon (i.e., Columbia River Estuary, Coos Bay, Florence; all <3.0/year), and California (i.e., Del Norte County, Crystal Springs, Farallon Island, Monterey Peninsula; all <1.0/year) precluded statistical analysis except for the circles indicated below.

The abundance of Rock Sandpipers was significantly lower in six count circles after 1982–83 than before (Table 1), and their abundance declined in two other circles monitored only since about this time: Narrow Cape/Kalsin Bay, Alaska: $\log_{10}$ (abundance) = 18.79 − 0.177 (year), r^2 = 0.37, P = 0.029; Skidegate, British Columbia: abundance = 15,123.7 - 327.1 (year) + 1.77 (year)^2, r^2 = 0.66, P = 0.0028). Conversely, their abundance increased in three count circles, particularly Homer and Glacier Bay, the two coastal Alaskan CBC circles where the species is most abundant (Table 1). The third count circle (Nanaimo) supported very few Rock Sandpipers in any year. Abundance did not change significantly in three Alaskan count circles (Cordova, Juneau, Sitka; Table 1), although the trend for the first two was negative. There were no clear patterns of change in four count circles (Adak and Valdez, Alaska; Masset and Sooke, British Columbia), although year-to-year variability and a lack of data prior to 1981-82 prevented formal analysis.

DISCUSSION

Although the Rock Sandpiper has always been considered an uncommon or rare and local winter resident in coastal British Columbia, Washington,

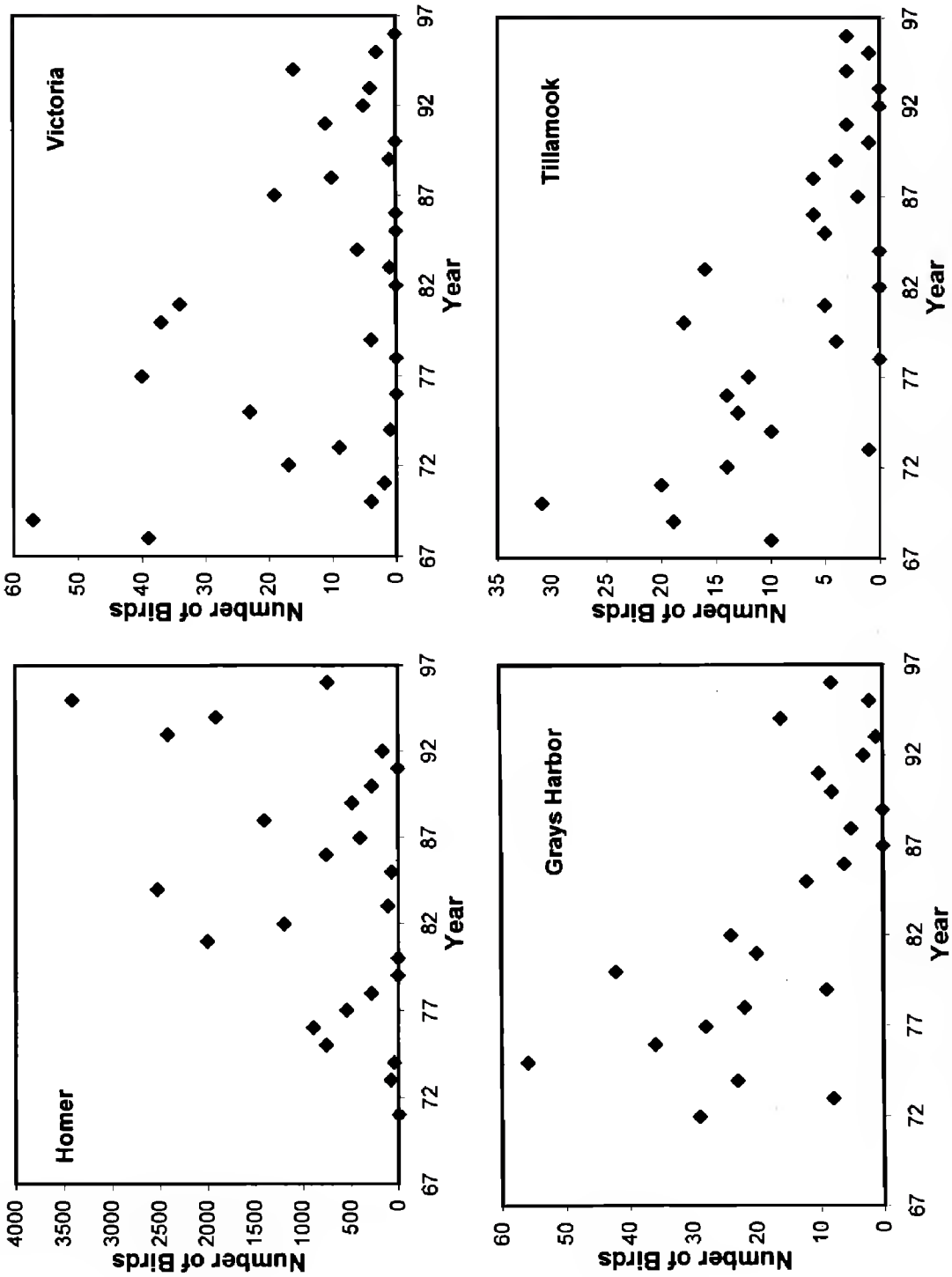

Figure 1. Scatter plots of Rock Sandpiper abundance at selected CBC count circles along the west coast of North America.

Oregon, and California (Gabrielson and Jewett 1940, Jewett et al. 1953, Campbell et al. 1990, Small 1994), my analyses clearly support Paulson's (1993) suggestion of a recent decline in wintering populations in that region. This decline was widespread, rapid, and appeared to include some areas of Alaska. It appeared to coincide, however, with a substantial increase at Homer and Glacier Bay, the two most important wintering areas (among the CBC circles) in Alaska. The decline in the more southerly wintering areas may therefore reflect a range contraction rather than an actual population decline.

The reason for the observed changes in Rock Sandpiper distribution and abundance is not understood. The Rock Sandpiper occupies rugged and often remote habitats during winter, and it occurs in many areas other than CBC circles, particularly in Alaska (e.g., Cook Inlet; Gill and Tibbitts 1999). Shoreline searches of areas outside of CBC circles have produced low numbers in the southern part of its winter distribution (e.g., Wahl 1996), and it is unlikely that the declines noted in British Columbia, Washington, Oregon, and California can be explained by local shifts in distribution. Because the decrease was rapid and widespread, a possible explanation must account for changes in environmental conditions over large regions.

El Niño affects atmospheric and oceanic conditions over vast portions of the earth, resulting in intense coastal storms, an increase in the elevation of sea level, decreased salinity, and higher water temperature (Glynn 1988). These conditions can affect species and communities directly (e.g., via nutrient depletion) or indirectly (e.g., via emigration from nutrient-deficient regions) (Glynn 1988). Such changes can be either transient or long-term. The 1982–83 El Niño was, at the time, considered to be the most significant known to science (Glynn 1988). Since that time, however, a persistent oceanic warming in the California Current and Gulf of Alaska has been documented (Fahrbach et al. 1991, Royer 1993, Veit et al. 1996). Various seabird species in the northeastern Pacific have experienced pronounced population changes during the past two decades (Pearcy and Schoener 1987, Wilson 1991, Ainley et al. 1994, Veit et al. 1996, Wahl and Tweit in press), most likely in response to reduced food supplies (e.g., fish; Hodder and Graybill 1985) associated with oceanic warming. Because Rock Sandpipers forage on rocky shorelines, the manner in which El Niño or oceanic warming might affect their food source is unclear, although two explanations seem plausible. First, it is possible that higher sea levels and more turbulent wave action disturbed the foraging zone or food sources. In Washington, however, Paine (1986) found no substantial or lasting changes in an intertidal mussel community following the 1982–83 El Niño.

Second, it is possible that nutrients were reduced in response to an increase in water temperature (Glynn 1988). McLain (1984) found a reduction in biological productivity in the California Current in association with El Niño warming. Prolonged changes in oceanographic conditions and fish populations in the Gulf of Alaska appear to have begun about 1980 (see Piatt and Anderson 1996). Although many marine species in the Gulf of Alaska were affected negatively by these changes (Piatt and Anderson 1996), Rock Sandpiper numbers appeared to increase at two (and likely

other) important wintering areas and overall show no signs of a decline. Although oceanic warming may have affected the Rock Sandpiper's distribution, the relationships I found are correlative and do not demonstrate cause and effect. Rock Sandpiper numbers, however, have not increased in the southern portion of the species' winter range since the initial decline. Additional research is necessary to identify factors that influence the distribution and abundance of Rock Sandpipers on their wintering grounds.

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FURTHER DATA ON FOOD ITEMS OF NORTHERN SAW-WHET OWLS (*AEGOLIUS ACADICUS BROOKSI*) ON THE QUEEN CHARLOTTE ISLANDS, BRITISH COLUMBIA

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Mammals dominate the list of prey items taken by the widespread nominate subspecies of the Northern Saw-whet Owl (*Aegolius acadicus acadicus*) throughout its range, including the Pacific Northwest (Forsman and Maser 1970, Boula 1982, Grove 1985). *Aegolius acadicus brooksi*, the only other subspecies recognized, is endemic to the Queen Charlotte Islands or Haida Gwaii, British Columbia (Cory 1918, AOU 1957, Sealy 1998), whence limited information has shown that its diet includes invertebrates—primarily from the intertidal zone—as well as vertebrate taxa in addition to small mammals. Previous data on *brooksi* came from examination of digestive tracts of 16 adults and one juvenile salvaged between 1977 and 1986, primarily in nonbreeding seasons, and from stable-carbon-isotope analyses of tissues of 12 of these specimens (Hobson and Sealy 1991). In addition to marine invertebrates, two individuals had taken Dusky Shrews (*Sorex monticola*), and a published reference was noted to fledglings with remains of passerine birds in their digestive tracts. Cowan (1989) listed the Northern Saw-whet Owl among the birds of the Queen Charlotte Islands that forage primarily away from the sea or shore, but little information was available on the food habits of *brooksi* at that time. Since the publication of Hobson and Sealy's (1991) results, further data on food items of *brooksi* have become available, and I give them here.

METHODS AND RESULTS

Sources of Information on Prey Items

Information on food habits obtained since Hobson and Sealy (1991) has come from (1) a specimen in the Cowan Museum of Zoology, University of British Columbia (UBC), (2) contents of digestive tracts (hereafter stomachs) of nine adults and one juvenile, examined 1990–1997, (3) examination of 11 pellets, and (4) direct observations of individuals foraging. Whole and fragmentary invertebrates and vertebrate prey items from stomachs and pellets are stored in the University of Manitoba Museum of Zoology (UMZM). Invertebrates and lower jaws of mammalian prey were compared to reference material collected on the Queen Charlotte Islands in 1986 (Hobson and Sealy 1991) and housed in the Royal British Columbia Museum and UMZM. Remains of Ancient Murrelets (*Synthliboramphus antiquus*) were identified by their distinctive down feathers and bone fragments; other bird remains were identified from portions of mandibles and entire primaries. Food items from all sources examined in this study (stomach contents, pellets, literature, museum specimen, and field observations) are summarized Table 1.

Table 1 Prey items of *Aegolius acadicus brooksi*

Species[a]	Samples with species (%)[b]
Invertebrates	
Amphipoda (*Orchestria traskiana, Orchestoidea californiana*)	46.3
Isopoda (*Ligia pallasii*)	7.3
Diptera (*Coelopa vanduzeei*)	7.3
Unidentified insect parts	2.4
Arachnida (*Anyphaena* sp.)	2.4
Amphibians	
Western Toad (*Bufo boreas*)	2.4
Birds	
Ancient Murrelet (*Synthliboramphus antiquus*)	7.3
Chestnut-backed Chickadee (*Poecile rufescens*)	2.4
Golden-crowned Kinglet (*Regulus satrapa*)	2.4
Hermit Thrush (*Catharus guttatus*)	2.4
Unidentified bird remains	4.9
Mammals	
Dusky Shrew (*Sorex monticola*)	9.8
Deer Mouse (*Peromyscus* sp.)	7.3

[a]From 41 sources: stomachs, including those examined by Hobson and Sealy (1991), containing at least a trace of prey remains (n = 26), pellets (n = 11), records from the literature (n = 2), a museum specimen (n = 1), and an observation of foraging where the prey item was identified (n = 1). More than one prey species sometimes occurred in the same stomach or pellet.

[b]Presence only, not absolute numbers of individual prey items.

Contents of Stomachs

Hobson and Sealy (1991) recorded *brooksi* eating predominantly invertebrates: sand-hoppers (the amphipods *Orchestria traskiana* and *Orchestoidea californiana*), seaweed flies (*Coelopa vanduzeei*), isopods (*Ligia pallasii*), and a juvenile spider (either *Anyphaena aperta* or *A. pacifica*). The spiders are not known to inhabit beaches; *A. aperta* occurs on tree foliage, *A. pacifica* in forest litter (R. A. Cannings pers. comm.). The other groups inhabit beaches in the region of the upper tide line and splash zone.

Additional records of invertebrate prey taken by *brooksi* have been obtained. A female (UBC 921) collected 1 September 1946 bears the notation "spider," removed from the bird's digestive tract. On 7 March 1995 Phred Collins (pers. comm.) noted the remains of sand-hoppers in a pellet regurgitated by a female owl hit by a vehicle; later I noted amphipod fragments in its stomach. The stomach of a male (4 November 1994) contained 47 intact individuals plus fragments of *Orchestoidea californiana* and a partial upper mandible, piece of cranium, and feathers of a Chestnut-backed Chickadee (*Poecile rufescens*). The stomach of a male (undated) contained amphipod fragments, and a female (15 January 1995) and a male (19 March 1996) salvaged near Masset had eaten 63+ and 54+ *O. californiana*, respectively. The stomach of a female (19 November 1996) contained amphipod fragments, that of a juvenile killed by a cat in August 1997 near Skidegate Inlet 16 amphipods plus fragments (*O. californiana*) and five isopods (*Ligia pallasii*).

Patch (1922) removed passerine feathers from stomachs of two fledglings collected on 21 July 1919 that "will probably prove to be [those] of some warbler." I did not locate these feathers. Stomachs of two adult females taken in 1946 contained a few feathers, which Ian McTaggart-Cowan (pers. comm.) believed were from an owl. Stomachs of a female (1 October 1990) from Moresby Island and of a male (21 November 1996) from Masset contained a Dusky Shrew and several shrew hairs, respectively.

Contents of Pellets

I examined 11 pellets, 10 collected on East Limestone Island (see map in Sealy 1998) by Robert Kelly in June 1997, from a roost used by two individuals, and one from Graham Island (examined by Collins). The pellets from East Limestone Island averaged 30.3 ± 4.7 (standard deviation) mm long and 15.4 ± 0.7 mm wide and contained the remains of two downy Ancient Murrelets, one Hermit Thrush (*Catharus guttatus*), one Golden-crowned Kinglet (*Regulus satrapa*), two Dusky Shrews, and three deer mice (*Peromyscus* sp.).

Observations of Northern Saw-whet Owls Hunting or Carrying Prey

Recent observations of saw-whet owls at or traveling to or from the tide line point to foraging in the intertidal zone or upper beach. On 5 April 1971 on Langara Island, I netted one (Sealy 1998) just above the splash zone on a sand beach, about 30 m from the nearest trees. The capture site suggests travel to or from the beach. Over a 2-year period through 1997, Frank Reindl (pers. comm.) saw about 15 Northern Saw-whet Owls flying toward and from the beach along the coast highway between Tlell and Skidegate. Finally, on 10 September 1997, Kelly (pers. comm.) observed foraging on sand beaches on two islands off the west coast of Moresby Island. On Helgeson Island, he saw a saw-whet owl foraging at 2300 along a line of rotting kelp washed by waves on a rising tide; for about 10 minutes, the owl hopped and flew back and forth along a 2-m strip of kelp. A second individual was observed standing in rotting kelp at the upper tide line on adjacent Saunders Island later the same night. Sand-hoppers, isopods, and seaweed flies are particularly numerous along the upper beaches at this stage of the tidal cycle (pers. obs.).

On 17 June 1974, about 15 km south of Sandspit, R. Wayne Campbell (pers. comm.) saw a Northern Saw-whet Owl perched on a snag, holding a Western Toad (*Bufo boreas*) in its claws. Minutes later, the owl carried the toad into the woods. One afternoon in June 1997 on Anthony Island, Collins (pers. comm.) saw a saw-whet owl investigate two Hermit Thrush nests, but at each nest the thrushes repelled the owl. Numerous observers have suggested or reported that *brooksi* takes newly hatched Ancient Murrelet chicks at night as they descend the slopes from their burrows to the sea. Blood et al. (1979) watched one chase an Ancient Murrelet chick on the floor of the colony on Lyell Island but did not ascertain if it was successful. Also on Lyell Island, Rodway et al. (1988) heard saw-whet owls calling at night during the murrelets' breeding season. On East Limestone and Reef islands, Gaston (1992) found Ancient Murrelet down feathers in pellets and

heard owls calling in the colony more frequently when the chicks departed for the sea than at other times of the year. On 31 May 1996, Campbell and others watched a saw-whet owl fly off with a downy Ancient Murrelet captured en route to the sea and observed a second one eating a murrelet chick. In the late 1970s, Tom E. Reimchen (pers. comm.) observed one pursuing a bat over Drizzle Lake. The labels of three specimens of nominate *acadicus* from southeast Alaska note the remains of a Little Brown Bat (*Myotis lucifugus*) removed from the stomach in one, a shrew in the second, and a vole (*Microtus* sp.) in the third.

DISCUSSION

This new information extends Hobson and Sealy's (1991) findings that *Aegolius acadicus brooksi* feeds on a wide array of taxa. Prey items and intended prey identified so far represent several groups of invertebrates, an amphibian, small birds, and small mammals. The large numbers of invertebrates in the samples, however, signify the importance of marine-derived protein in the diet of these owls, at least at the end of the breeding season and during the nonbreeding season.

On the surface, available information suggests that *brooksi* takes a wider range of prey than does nominate *acadicus*. Nonmammalian prey constitutes less than 5% of the prey species of both eastern and western populations of *acadicus* (Cannings 1993). Lists of prey items from the Pacific Northwest are dominated by species of *Peromyscus* and *Microtus*. Of 36 individuals removed from pellets collected in Oregon, all but one were small mammals (Forsman and Maser 1970). Also in Oregon, of 77 prey from 57 pellets, 74 (96%) were mammals (Boula 1982). In Washington, Grove (1985) identified 770 prey items from more than 900 pellets, of which more than 95% were small mammals. The apparent dominance of small mammals in the diet of *acadicus*, however, may reflect the lack of information on prey taken by coastal populations of this subspecies. Furthermore, the prey items sampled above came only from pellets, whereas data on the diet of *brooksi* have come from observations of owls foraging, stomach contents, and isotope analysis of tissues, as well as pellet examination. Coastal populations of *acadicus* possibly concentrate on marine invertebrates at certain times of the year, but this has not been confirmed.

Analysis of stable carbon isotopes permits the determination of the relative contributions of protein derived from marine and terrestrial ecosystems to the diets of birds. By examining both muscle and bone collagen, Hobson and Sealy (1991) ascertained both short-term (i.e., on the order of several weeks) and long-term (i.e., approaching the lifetime of the individual) dietary information. The collagen signal in young birds, however, reflects the diet at a time when the bones are growing. Hobson and Sealy (1991) found that most *brooksi* sampled had eaten some marine protein; two females salvaged in autumn had fed exclusively on marine protein. The remaining individuals showed little, if any, long-term marine contribution to their diets. The measurements indicated that marine-based foods make up 10% to 15% of the lifetime diet of the owls. Muscle tissue of an October juvenile (Sealy 1998) showed a marine contribution to the diet of approximately 50%

(Hobson and Sealy 1991). Isopods and amphipods taken by the juvenile in 1997 reveal that marine-derived foods may be taken soon after fledging, possibly as soon as the young owls can fly and forage on their own.

Stable-carbon-isotope and stomach-content analyses suggest that some *brooksi* specialize on protein derived from the marine environment during the nonbreeding season. Others take primarily terrestrial prey items or both marine and terrestrial food, as indicated by a stomach that contained a bird and intertidal invertebrates. Prey used may reflect the location of home ranges of individual owls, whether adjacent to the coast or inland, and whether the sites are stable year round. How far owls travel to obtain marine prey is not known.

Northern Saw-whet Owls also are opportunistic foragers, as some individuals take Ancient Murrelet chicks that are available only for 5 to 6 weeks each year (Sealy 1976, Gaston 1992). Gaston (1992) suspected that they specialize on *Peromyscus* on East Limestone Island, and the remains of these mice in some pellets collected there support his contention. Shrews and deer mice are widely distributed on Graham and Moresby islands, and each small island where *brooksi* has been reported (see Sealy 1998) supports populations of *Peromyscus* (Foster 1965), breeding murrelets and passerines (Campbell 1969, Rodway et al. 1988) and, of course, terrestrial and marine invertebrates.

SUMMARY

Prey items taken by *Aegolius acadicus brooksi* on the Queen Charlotte Islands were obtained from 41 sources: stomach contents (including those examined by Hobson and Sealy 1991), pellets, records from the literature, a museum specimen, and observations of foraging or carrying prey. Twelve species were identified among the prey items: five invertebrates (mostly from the intertidal), a toad, a seabird, three passerines, and two small mammals.

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GREATER SANDHILL CRANE PRODUCTIVITY ON PRIVATELY OWNED WETLANDS IN EASTERN OREGON

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Except at Malheur National Wildlife Refuge, in Harney County, data on the nesting and recruitment of the Greater Sandhill Crane (*Grus canadensis tabida*) in eastern Oregon have not been documented. The objective of this paper is to assess the reproductive performance on privately owned wetlands of the Central Valley population, classified as sensitive by the state of Oregon.

STUDY AREA AND METHODS

The study area consisted of six sites, from Three-mile Ranch on the south to Bear Valley on the north. The three sites in Harney County are within the Great Basin, where wetlands are created by drainage from nearby mountain ranges. Adjoining these wetlands are shrub-covered expanses dominated by Big Sagebrush (*Artemisia tridentata*). The sites in Grant County are in the Blue Mountains, where wetlands are usually adjacent to coniferous forest, primarily of Ponderosa Pine (*Pinus ponderosa*). Elevations vary from about 1240 m on the Silvies River floodplain to about 1620 m at Crane Prairie.

Among the Great Basin sites, Three-mile Ranch is located about 44 km south of Frenchglen or about 45 km north of the Oregon–Nevada border. Water is provided by Three-mile Creek, which drains westward off Steens Mountain onto about 50 ha of meadows. The Home Creek Ranch site is 35 km south-southwest of Frenchglen and consists of about 150 ha of wet meadows, with water from Home Creek, which also drains west off Steens Mountain. Farther north, the Silvies River floodplain is southeast of Burns. The Silvies River and several smaller creeks disperse water over about 24,300 ha between Burns and Malheur National Wildlife Refuge, creating a mosaic of meadow-marsh wetlands and shrub-covered uplands. Among the three Blue Mountain sites, Crane Prairie is a 200-ha meadow surrounded by coniferous forests and situated 40 km southeast of Prairie City; water is provided by Crane Creek. Bear Valley, 28 km south-southwest of John Day, contains an extensive meadow complex surrounded by sagebrush and pine-forested uplands. Water is provided by the Silvies River, which enters the valley in the northwest, and Bear Creek, which enters from the east. Silvies Valley, 42 km south of John Day, is bisected by the Silvies River and consists of several thousand hectares of wet meadows and willows (*Salix* spp.), with uplands covered with sagebrush, Basin Wildrye (*Elymus cinereus*), and Ponderosa Pine.

I located nests in 1976 by ground searching between 18 April and 25 May, whereas in 1986 I found nests primarily between 15 April and 6 June. A nest in Crane Prairie, however, was not discovered until 18 June. After a nest was located, I recorded vegetation height and type, water depth, land-management regime, and egg-incubation stage (Westerskov 1950). Con-

cealment was based on criteria described by Littlefield (1995a). After the expected hatching dates, I revisited sites and assessed fates. In late July and early August I revisited the sites again and counted fledged young.

RESULTS

In 1976, I surveyed two of the study sites, finding 80 pairs (68 on the Silvies River floodplain; 12 in Silvies Valley). In 1986 I surveyed five of the six sites, finding 112 pairs (from one at Crane Prairie to 70 on the Silvies River floodplain). Most territories were on meadows mowed in summer and grazed by cattle in winter. One exception was Crane Prairie, which cattle cannot reach in winter because of deep snow. The sites differed in nesting chronology so I discuss them separately, from south to north.

Three-mile Ranch. I found a nest on 13 May 1986 on a winter-grazed meadow of spikerush (*Eleocharis* sp.) in 23.6 cm of water. Flotation indicated the clutch was laid about 18 April. The surrounding vegetation had been heavily grazed by cattle and concealment was poor, but both eggs hatched. Of the four pairs having breeding territories on the ranch, all were still present on 5 August and one had a single fledgling, but I could not determine which pair had reproduced successfully. A reservoir provided a favorable and persistent roosting site through the brooding period.

Home Creek Ranch. This site generally receives spring and summer water sufficient for nesting cranes. I found the nests of six of the seven resident pairs on 13 and 15 May 1986. Four clutches contained two eggs, two a single egg each, for a mean clutch size of 1.67. The nests were surrounded predominantly by spikerush, but one was in Reed Canarygrass (*Phalaris arundinacea*). Mean vegetation height was 24.7 cm (standard deviation 12.99), ranging from 0 to 37 cm. Mean water depth was 9.2 cm (SD 5.12), ranging from 0 (moist ground) to 13.9 cm. All were on mowed and winter-grazed meadows, with four fairly well concealed and two poorly concealed. New vegetative growth provided some concealment, but little cover would have been available when clutches were laid between mid-April and early May. Five clutches hatched, but the egg of a single-egg clutch had a dead embryo. Apparently no young fledged, however; five pairs and a single adult were at the site on 5 August.

Silvies River Floodplain. Most of the nests I studied were here, where 68 and 70 pairs had breeding territories in 1976 and 1986, respectively. In 1976, 31 of 35 nests (88.6%) were in mowed and grazed wetlands, two in unmowed grazed meadows, and one each in sites idle and mowed only. Twenty-two of 27 nests (81.5%) at which I recorded concealment were poorly concealed, four were fairly well concealed, and only one was well concealed. Mean vegetation height was 29 cm (SD 17.98), ranging from 0 to 65 cm. All clutches had two eggs. Irrigated meadows supported 25 of the nests (71.4%), whereas six were in Broad-fruited Burreed (*Sparganium eurycarpum*) and three were in Hardstem Bulrush (*Scirpus acutus*); one nest was on a small unvegetated island. Twenty-six nests (74.3%) hatched at least one egg. Two clutches were infertile, and one chick died while pipping. Predation accounted for the loss of seven clutches (20%), with Common Ravens (*Corvus corax*) taking four, Coyotes (*Canis latrans*) two; one was

perhaps lost to a gull. From the 68 pairs on the floodplain in 1976, 12 young fledged, for a recruitment rate of 8.1%.

In 1986 I assessed 12 nests, of which nine were in mowed and winter-grazed wetlands, two in idle meadows, and one in an unmowed grazed meadow. Nine were poorly concealed, two fairly well concealed, and one well concealed. Mean vegetation height was 16.3 cm (SD 14.94), ranging from 0 to 50 cm; mean water depth was 5.6 cm (SD 5.89), ranging from 0 to 16.6 cm. Mean clutch size was 1.97. Eight nests were in meadows, two in burreed, one in Hardstem Bulrush, and one in flooded Black Greasewood (*Sarcobatus vermiculatus*). Five clutches hatched (41.7%) and seven (58.3%) were lost to predators—four to coyotes and three to ravens. From 70 pairs on the floodplain in 1986 only nine young fledged, for a recruitment rate of 6%. Most clutches were laid from late April through early May in both years.

Silvies Valley. I found three nests on 5 May 1976. Eggs were laid in late April. All nests were in flooded meadows at the valley's northern end and were in mowed and winter-grazed habitat, poorly concealed. Mean height of surrounding vegetation was 18.3 cm (SD 2.89), range 15 to 20 cm; water depth was 15 cm at all three nests. Each clutch had two eggs and all hatched successfully. From the total 12 pairs in the valley, three young fledged, for a recruitment rate of 20%.

Crane Prairie. There was only one pair here, and I found its nest in a small beaver pond at the southwestern edge of the prairie on 18 June 1986. In a small stand of Beaked Sedge (*Carex rostrata*) and poorly concealed, the clutch had hatched before discovery. Vegetation height and water depth were not measured. The pair was still on the prairie on 14 August, but no young was present.

Bear Valley. I assessed five nests on the Holliday Ranch in northwestern Bear Valley in May 1986. Most clutches were laid in early May. Nest sites were in mowed and winter-grazed meadows, except for one on a moist saltgrass (*Distichlis stricta*) flat. Four were poorly concealed, one fairly well. Mean vegetation height was 25 cm (SD 7.07), range 20–35 cm. Mean water depth was 8.5 cm (SD 7.56), range 0–16.1 cm. All nests contained two eggs, of which three clutches (60%) hatched successfully, while two were destroyed by coyotes. From the 22 pairs nesting in Bear Valley in 1986, five young fledged for a recruitment rate of 10.2%.

DISCUSSION

Nesting success on these privately owned wetlands was relatively high (69.8%) and would have approached 75% had not three clutches (4.8%) been infertile or addled. Of clutches lost to predators, coyotes destroyed slightly more (12.7%) than Common Ravens (11.1%); the only other loss of eggs to predation was attributed to an unknown bird, probably a gull. Recruitment, however, for the 80 pairs breeding on the Silvies River floodplain and in Silvies Valley in 1976 was 8.6%, and for the 112 pairs breeding on the five 1986 study sites was 6.8%, both rates below that considered necessary for population stability (Miller et al. 1972). Recruitment at Malheur National Wildlife Refuge in 1976 and 1986 was 9.1% and

12.1%, respectively. The high rate at Malheur in 1986 was attributed to an intensive predator-management program, initiated the previous winter. Though there were no significant differences in the cranes' nesting success between private landholdings and Malheur in 1976 ($\chi^2 = 1.66$, 1 df, $P > 0.05$) and 1986 ($\chi^2 = 0.63$, 1 df, $P > 0.05$), or recruitment rate in 1976 ($\chi^2 = 0.27$, 1 df, $P > 0.05$), recruitment was significantly higher at Malheur in 1986 ($\chi^2 = 4.42$, 1 df, $P < 0.05$), when predators were managed.

Previous studies of Sandhill Crane productivity in Oregon have been confined primarily to Malheur National Wildlife Refuge in the southeast (Littlefield 1995b) and Sycan Marsh, Lake County, in the south-central part of the state (Stern et al. 1987). Other than a few general notes and comments for a few pairs (e. g., Walker 1917, Gullion 1947, Roest 1957), little information on cranes nesting elsewhere, particularly on privately owned lands, has been documented. Seventy-three percent of the 692 pairs found in Oregon in 1986 were on privately owned wetlands (Littlefield et al. 1994). With such a large percentage of the population nesting on private lands, the species' welfare in Oregon may depend largely on reproductive success on these wetlands. Even though local landowners and government trappers frequently attempt to control coyotes, other factors such as early draining of marshes and hay-mowing in July can result in high chick mortality, from either starvation or injury by mowing equipment. Coyotes also frequently hunt on recently mowed meadows (Littlefield and Cornely 1997). In addition, most meadows are grazed by cattle in winter, reducing or eliminating residual nest-concealing cover, as most pairs initiate nesting before the onset of new spring growth.

The objective of this study was to assess the reproductive performance of pairs of the Greater Sandhill Crane nesting and brooding under these agricultural practices and habitat conditions. Though nesting success was relatively high, survival of young was low, particularly in the Great Basin. Low recruitment was especially evident on the Silvies River floodplain, where the majority of breeding pairs studied was located. For pairs breeding in Blue Mountain valleys (except at Crane Prairie), recruitment rates were sufficient for stability or perhaps even an increase.

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NOTES

MORE ADDITIONS TO THE BIRDS OF THE NEVADA TEST SITE

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Observations of birds on the Nevada Test Site, an area of restricted access in southern Nye County administered by the U.S. Department of Energy, have been recorded since the 1960s (Hayward et al. 1963). Early surveys of birds on the test site generally focused on the eastern and northern areas affected by nuclear testing and other human activities (Hayward et al. 1963, Richards 1962) or southern portions of the test site around Mercury (Castetter and Hill 1979) and Rock Valley (Rundel and Gibson 1996). We report observations made in the southwestern portion of the test site near Yucca Mountain, an area of interest because the Department of Energy is studying the mountain as a potential site for storing spent nuclear fuel and high-level nuclear waste.

From 1989 to 1998 we recorded observations on Yucca Mountain and on Jackass Flats to the east (Boone and Lederle 1998). The study area is located on the northern edge of the Mojave Desert along an ecotone between the Great Basin and Mojave deserts and includes floristic characteristics of both deserts (Beatley 1976). Vegetation at lower elevations is dominated by Creosotebush (*Larrea tridentata*), and this plus other shrubs are common at higher elevations, but Big Sagebrush (*Artemisia tridentata*) is not common. In the study area, four small (0.03–0.08 ha) man-made ponds and one natural spring provide water continuously. Vegetation at the water sources includes Saltcedar (*Tamarix ramosissima*), Southern Cattail (*Typha domingensis*), Goodding's Willow (*Salix gooddingii*), cottonwood (*Populus* spp.), and herbaceous species. This desert area receives little precipitation and experiences large daily and seasonal temperature fluctuations.

From 1989 to 1998 we observed 120 species (Boone and Lederle 1998) and added 13 species to the list of birds previously known to occur on the test site (Castetter and Hill 1979, Hayward et al. 1963, Richards 1962, Rundel and Gibson 1996). Most observations were opportunistic, and the only systematic study of birds in the area focused on ravens and raptors (Lederle et al. 1997). The new species are the Common Loon (*Gavia immer*; Midway Valley; 5 November 1995), American Bittern (*Botaurus lentiginosus*; Jackass Flats, Well J-10; 8 October 1997), Sora (*Porzana carolina*; Jackass Flats, pond formerly located south of Well J-10; 5 May 1993), Long-billed Curlew (*Numenius americanus*; Midway Valley; 30 June 1992), Barn Owl (*Tyto alba*; Midway Valley; 15 June 1996), Black-chinned Hummingbird (*Archilochus alexandri*; Calico Hills; 25 March 1993), Williamson's Sapsucker (*Sphyrapicus thyroideus*; Cane Spring; 17 October 1996), Chestnut-sided Warbler (*Dendroica pensylvanica*; Jackass Flats, Well J-11; 8 October 1997), Northern Waterthrush (*Seiurus noveboracensis*; Jackass Flats, Well J-11; 8 October 1997), Varied Thrush (*Ixoreus naevius*; Yucca Mountain; 8 October 1992), Rose-breasted Grosbeak (*Pheucticus ludovicianus*; Jackass Flats, Well J-11; 8 October 1997), Great-tailed Grackle (*Quiscalus mexicanus*; Jackass Flats; 1992), and Hooded Oriole (*Icterus cucullatus*; Jackass Flats, Well J-11; 15 July 1997). Most of these observations were made at the ponds during migration, and given the number of species that traverse the region (> 350 species at Death Valley National Park 60 km to the southwest), these observations were not surprising.

In addition to the newly reported species, we recorded nesting of eight species not previously reported as breeding on the Nevada Test Site: Chukar (*Alectoris chukar*), Gambel's Quail (*Callipepla gambelii*), Barn Owl, Burrowing Owl (*Athene cunicularia*), Lesser Nighthawk (*Chordeiles acutipennis*), Rock Wren (*Salpinctes obsoletus*), European Starling (*Sturnus vulgaris*), and House Sparrow (*Passer domesticus*).

Great-tailed Grackles, not previously reported on the test site, were sighted frequently in the Yucca Mountain area beginning in 1992. The range of this species has been expanding to the west and north (Scheuering and Ivey 1995), and it probably first appeared on the Yucca Mountain area after 1982, because it was not noted during surveys that year.

We noted several eastern species on 8 October 1997 (Chestnut-sided Warbler, Northern Waterthrush, and Rose-breasted Grosbeak). On the basis of unpublished checklists, all three species are considered rare and have been observed on the nearby Desert National Wildlife Range (approximately 100 km southeast of Yucca Mountain) and in Death Valley National Park (approximately 60 km southwest), but none have been noted at Ash Meadows National Wildlife Refuge (approximately 50 km south). Alcorn (1988) considered the Chestnut-sided Warbler to be rare in Nevada, the Northern Waterthrush to be an accidental transient, and the Rose-breasted Grosbeak to be a spring and fall migrant.

The male Williamson's Sapsucker was observed on 17 October 1996 in a small riparian area containing large cottonwoods and Saltcedar at approximately 1400 m elevation. This montane species is considered a resident in some of the northern mountain ranges in Nevada (Alcorn 1988). In southern Nevada, Austin and Bradley (1971) considered it a "visitant in riparian areas," from April through November.

Reported observations of the Peregrine Falcon (*Falco peregrinus*) during the 1970s were doubted by Castetter and Hill (1979). However, this species was observed during 1992 at Yucca Flats on the eastern side of the test site (Hunter 1994).

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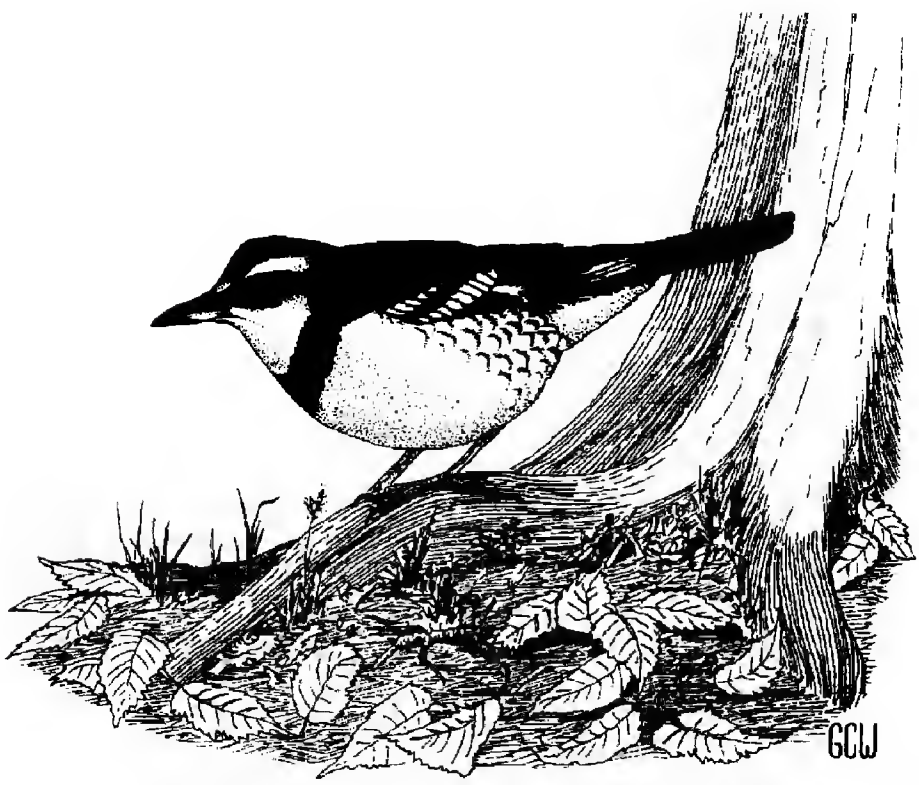

Varied Thrush *Sketch by George C. West*

NEW HISTORIC RECORDS OF ANNA'S HUMMINGBIRD FROM OREGON

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The Anna's Hummingbird has spread north along the west coast of North America since the mid-20th century, and Zimmerman (1973) provided a useful overview of a principal period of this expansion. In that survey of published and unpublished records he noted that the first reports for Oregon were in 1964 in the Rogue Valley. He also stated that there "evidently was little or no range extension [north of California] between 1940 and 1960."

Zimmerman apparently missed a published record of a male observed by Tom McCamant at Ashland, Jackson Co., from 31 December 1958 to the end of March 1959 (Boggs and Boggs 1960), later included in a publication on birds of Jackson County (Browning 1975).

I recently reviewed transcribed field notes of Hilda Reiher, an active bird observer on the southern Oregon coast from the 1940s through the early 1970s. She noted an Anna's Hummingbird at her feeder in North Bend, Oregon, on 17 December 1944, a record that had not been published until I included it in Birds of Coos County, Oregon (Contreras 1998). She did not record the species at the same location again until 1962.

I met Hilda Reiher shortly before her death in the early 1970s, and I have examined many of her records. From the overall quality and reliability of her observations I have no reason to doubt the accuracy of the 1944 record of Anna's Hummingbird.

Because researchers examining the early history of the species' northward expansion may rely on Zimmerman's excellent overview as the last word in the period before 1970, I submit this note to make these two additional early records more readily available.

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BOOK REVIEWS

The National Geographic Society Field Guide to the Birds of North America (consultants Jon L. Dunn, Jonathan K. Alderfer, and Paul E. Lehman). 1999. National Geographic Society, Washington, D.C. 480 pages, including approx. 220 pages of full-color plates, maps for most species. Paper, $21.95. ISBN 0-7922-7451-2.

The National Geographic Society (NGS) guide is widely regarded as the most comprehensive field guide to North American birds. Its meat is concise text and facing-page color illustrations for all but the rarest vagrant species recorded from North America, i.e., north of the Mexican border. The first edition appeared in 1983, the second in 1987, and now we have the third. One or both of the earlier editions are probably familiar to most readers, so this review concentrates on the changes in the third edition (hereafter NG3). Of note is that 80 species have been added, as a result of new records, newly established feral populations, and taxonomic splits, while a few species (failed introductions of non-native species) have been deleted.

On looking through NG3, I inferred that its production had been rushed. I learned subsequently that the consultants and many NGS staff lobbied for another year in which to complete this revision, but top NGS executives overruled this to make time for more "important" plans for the year 2000. It is sad that some care so little for the market at which a book is aimed, and that financial gain and prestige supersede quality. Despite this, NG3 is a good field guide, but it could have been much better, especially with respect to the illustrations, upon which so many of us rely. For example, there was no time to show multiple races of the Dunlin (specimens had been picked out), and many artists had to work to unrealistic deadlines. Even the best artists cannot produce great work with too little time.

Beyond a sense that it had been rushed, the first thing I noticed in NG3 was that the species accounts follow AOU taxonomic sequence much more closely than in the second edition. Now at least I have a good chance of finding the tanagers or quail where I'd expect them, and after I adapt to the latest classification I should be able to find the crows and vireos. To many birders, taxonomic arrangement may seem esoteric, but to others, a standardized sequence is useful, facilitating reference to multiple publications, and I am glad to see that NG3 has been changed in this way.

The introduction to NG3 is expanded, with more details on bird topography, molt and plumage sequence, plumage variation, and how to identify birds in the field. I found this revamped introduction an improvement, although I did note two points that could be corrected in a second printing: under the discussion of scientific names, the subspecies *fasciatus* of Three-toed Woodpecker is described as an intermediate *species*, and in the plumage-sequence section birds are reportedly *born* naked, rather than hatched. Oddly, much of the introduction seems directed at beginning or intermediate-level birders, yet the remainder of the book appears not to be produced with this audience in mind.

The species accounts are a model of information condensation, and the newly added boldface text helps highlight points such as age or sex differences, voice, and range. I found no species account that remained unaltered. Changes relate to all aspects of the text, from new descriptions of calls (e.g., Xantus' versus Craveri's murrelets) to discussion of "new" field marks (e.g., wing-tip shape of Black-chinned versus Ruby-throated hummingbirds) to updated range information (e.g., Black Swift now thought to winter in South America). Geographic variation receives more coverage, with some conspicuously distinct subspecies being featured, as in the Chestnut-backed Chickadee or the greatly expanded accounts of the Eastern and Spotted towhees. Inevitably, some changes that could have happened didn't: the Northern Goshawk still "preys chiefly on birds and ducks," while the Western Tanager remains mute, apparently, even though the Flame-colored has a "song similar to

Western Tanager." The second edition noted that the Dusky-capped Flycatcher was formerly called the Olivaceous Flycatcher; similarly, "formerly called Mexican Crow" would have been helpful in the new Tamaulipas Crow account. These are minor points, however, in what has been a huge amount of work. New information is packed in, and the text alone makes the third edition worth getting even if you have the second.

The maps have been revised thoroughly, and reddish and purple shading replace yellow and green for summer and resident distributions, respectively. While these colors may be less "intuitive" they show up far better, which, with a larger scale for many maps, is another plus of NG3 over its predecessors. For example, notice the breeding outposts for the Gray, Dusky, and Willow flycatchers, none of which would have been discernable even had they been included in the second edition. Conversely, however, winter ranges are now shown in a paler blue than in the second edition. This means one has to strain to discern the coastal winter ranges of many shorebirds—a darker blue would be much better. While I'm sure some readers will find errors here and there, I was impressed with the maps' accuracy. They show almost too much detail for the scales employed! Distributional information in the text has also been updated meticulously, including such oddball records as the Red-flanked Bluetail from the Farallon Islands, even one as recent as the Olive-backed Pipit. Strangely, though, California records of the Arctic Warbler were not mentioned.

What about the plates? Many are new. A close look reveals great variation in the printing among different plates (indeed, within some plates) and that many of the individual older paintings have been subtly altered and/or moved around on a plate. The plates, I suspect, are what will draw the most criticism, but some of this criticism should not be directed at the artists. At least in the copies I have seen, many illustrations carried over from the second edition have been printed far too dark and show an imbalance of pigmentation. Conversely, many of the newly added illustrations are much better, although some are rather washed out, e.g., those of the *Catharus* thrushes. Confounding our expectations in the digital age, color printing remains an analog craft ill adapted to mass production. There is a big and increasing market for bird books, at least in North America (over a million copies of the NGS field guides have been printed), but apparently the publishers were unconcerned about producing a field guide whose color reproduction is, quite frankly, substandard. Presumably, deadlines compromised quality.

The choice of which illustrations to redo and which to leave must have been extremely difficult. New plates that stand out as excellent include those of the loons, golden-plovers, phalaropes, and *Empidonax* flycatchers (except for subspecies *brewsteri* of the Willow). Other great improvements are in the swifts and *Catharus* thrushes. Some new plates, however, are less successful than others, e.g., those of the *Myiarchus* flycatchers or the thrashers. Amazingly, the small gorgeted hummingbirds were not replaced, yet the plate of *Piranga* tanagers was repainted—surely not the best allocation of resources. Striking style differences show in some plates where different artists' work has been combined. Generally this does not affect identification—although the new "dwarf morph" Wedge-tailed Shearwaters look odd in comparison with the old "giant" Flesh-footed Shearwater. The scale is awry within other plates, e.g., the Common Raven is still a giant among crows (and the angle of the Chihuahuan Raven's bill does not lend itself to appreciation of the length of the diagnostic rictal bristles). One could go on about this and that, but in general the plates are good to excellent, particularly when used in tandem with the text. Still, I can't help but feel that more resources should have been made available for revising the plates: more could and should have been recommissioned.

So, what are the alternatives? The NGS guide is good for more advanced birders, but for a growing majority of beginning and intermediate-level birders it has too much detail, too much emphasis on rarities and vagrants. For example, two new plates of

Siberian flycatchers and small Old World thrushes (Wheatear, etc.) are beautiful additions, but expanded coverage of plumage variation in the newly split Solitary Vireo complex would have been infinitely more useful for 99% or more of potential users. Alternatively, take a look at some new plates. The Mourning and White-winged doves are lost among a mass of vagrants and exotics (checking the maps helps narrow down choices in such cases). Among the albatrosses, images of the two regularly occurring species (Black-footed and Laysan) are tiny, while most of the next plate is devoted to large images of two vagrant albatrosses. It is nice to have information on all of these species, but for many birders such comprehensiveness may not equate to comprehension. Instead, the recent albeit misnamed American Bird Conservancy's field guide to *All the Birds* (despite some poor plates) or the last (1994) Golden Guide for eastern North America (with plates by Jim Coe that are among the best ever painted of many North American birds) may be more useful and user-friendly to many birders. In addition, for all but the most widely traveled and vagrant-oriented birders, David Sibley's forthcoming North American field guide (due in 2000) should relegate NG3 to a lower ranking. Had NGS taken more time with its revision this might not have been the case.

When it first appeared, the NGS guide was an ambitious undertaking. It has improved with each revision, and the most serious birders will want NG3. Greater consistency in the illustrations and their printing, more attention to some of the commoner species, and perhaps a layout that more easily distinguishes vagrants from regular species would be things to consider in future editions, or in any other North American guide. Despite some misgivings, I consider NG3 an excellent guide and am glad it exists. I recommend it for its wealth of information, its up-to-date distributional data, and the relatively comprehensive level of plumages it illustrates.

Steve N. G. Howell

Habitat Characteristics of Some Passerine Birds in Western North American Taiga, by Brina Kessel, 1998. University of Alaska Press. 120 pages, 9 color plates, 13 black and white photos. Paper, $16.95. ISBN 0-912006-98-6.

This short monograph is a welcome contribution to the study of Alaska ornithology, particularly since so little information has been published on use of habitats by passerines in the region. The title is misleading, through, for the book is not a comprehensive treatise on habitats across western North American taiga. Rather, it reports primarily on the results of a two-summer study of a single drainage in central Alaska. The information is augmented by comparisons with earlier studies by the author and other ornithologists from different sites in Alaska. Nonetheless, considering the paucity of data on this group of birds in Alaska, the work constitutes a valuable reference and review of current information on passerine breeding habitats in Alaska's taiga.

Taiga is defined as the subarctic forested region of the northern hemisphere, encompassing not only forests but also the mosaic of open woodlands, shrublands, wetlands, bogs, and alpine tundra within the forested zone. The author takes a Grinnellian approach to identifying the major environmental factors that help define the species-specific niches of taiga birds in Alaska. In her study, she censused breeding birds on twelve 10-ha plots selected to represent fairly homogeneous tracts of each of the major habitats described for Alaska's taiga. She systematically measured the characteristics and vegetation of each plot in detail, then used correlation and cluster analysis to discern relationships between breeding densities of selected passerines and characteristics of the various habitat types.

The format of the book is a hybrid between a traditional scientific research publication and a less formal overview, perhaps in order to appeal to a broader

audience. The introductory chapters provide an interesting discussion of taiga habitats as well as more technical descriptions of the study plots. Black and white photographs show aerial and close-up views of most of the habitats. The methods section is followed by a series of annotated accounts for 15 of the most common passerines recorded. Each account summarized the habitat variables strongly correlated with breeding density, briefly discusses differences among plots, and compares results with those from other studies in Alaska. Short concluding chapters discuss the use of habitats by various thrushes, the high productivity of forests of black cottonwood, and the relative stability in avian use of spruce forests. Most of the data are summarized in tabular form, although a dendrogram displays results of the cluster analysis for habitat similarity among 22 species. Appealing photographs of 15 of the most common birds provide an aesthetic touch.

Overall, the volume was well edited. I found a single typo in one of the tables, in which the rows of data were not aligned correctly. The short introductory and concluding chapters were written clearly and integrate ideas of interest to both general and technical readers. The species accounts are more difficult to digest because of the plethora of numbers and codes for habitat variables embedded in the text.

As a descriptive work of habitat use by passerines in Alaska this study is valuable. Analytically, however, there are some weaknesses, which the author acknowledges at least in part. Study plots were selected nonrandomly, and each habitat was represented by only a single plot. The author attempts to correct for this problem by examining relationships between bird detection and habitat characteristics at the subplot level, a classic case of pseudo-replication. One other statistical weakness is the use of a series of bivariate correlations between bird densities and individual habitat variables rather than a multivariate analysis. With over 40 habitat variables and only 12 plots, some spurious relationships would likely emerge. In a few instances the author fell prey to the common tendency in such correlative studies to infer cause–effect relationships with insufficient data. The author compensates for these analytical weaknesses by drawing upon other studies from across the region to confirm or temper the patterns from this study. In this, her 40 years of experience in Alaska ornithology and broad knowledge of the species' ecology are significant assets.

This small, attractive volume is a useful reference for the growing number of ornithologists studying passerines in taiga or boreal forests. It would also be a helpful technical reference for anyone studying the 15 species treated in detail, the Gray Jay (*Perisoreus canadensis*), Ruby-crowned Kinglet (*Regulus calendula*), four thrushes (*Catharus minimus*, *C. ustulatus*, *C. guttatus*, *Ixoreus naevius*), the Arctic Warbler (*Phylloscopus borealis*), three New World warblers (*Dendroica coronata*, *D. striata*, *Wilsonia pusilla*), and five sparrows (*Spizella arborea*, *Passerculus sandwichensis*, *Passerella iliaca*, *Zonotrichia leucophrys*, *Junco hyemalis*). Resource managers would find useful the clear summary tables as well as the more general introductory and concluding chapters on taiga habitats. Anyone interested in northern birds in general or in the ecological question of niche partitioning should find some intriguing nuggets of thought in this book.

Colleen M. Handel

FEATURED PHOTO

MOLT, AGEING, AND IDENTIFICATION OF IMMATURE LONG-TAILED JAEGERS

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Immature jaegers pose a notorious identification problem. Here I offer a synthesis of the problem and discuss molt, migration, and the immature plumage stages of the long-tailed Jaegar (*Stercorarius longicaudus*). No study of the immature plumages of jaegers has been based on birds of known age, however, and descriptions of differences in molt and plumage by age are hypotheses that could benefit from testing.

Like many other long-distance migrants, jaegers molt entirely or almost entirely on their nonbreeding or winter grounds, and the molts of immatures resemble those of adults in timing and extent. Adult Long-tailed Jaegers undergo a complete prebasic molt from late September to March, while first-year birds molt from October to June, although some may not finish until August (Cramp and Simmons 1983, Wiley and Lee 1998, pers. obs.). Head and body feathers are molted first, in adults mainly from late September to December, followed by flight feathers, in adults from November to March. Adults' prealternate molt in March and April could, therefore, overlap with the end of their protracted prebasic molt. Misunderstanding of this molt strategy (or molt terminology) has resulted in conclusions that birds such as the Sabine's Gull (*Xema sabini*) have a partial (prebasic) molt in fall and a complete (prealternate) molt in late winter and spring (e.g., Grant 1986).

It has been suggested that jaegers undergo increasingly extensive prealternate molts with age (Cramp and Simmons 1983), and that during a bird's first year there may be no prealternate molt (e.g., Higgins and Davies 1996). Younger birds' molting less may reflect their inexperience at foraging, giving them fuel to replace fewer feathers. There is, however, no free molt: if birds can't find enough food, they can't replace their feathers, and even adults may not always complete their prealternate molt (Wiley and Lee 1998).

Wiley and Lee (1998) suggested that one-year-old Long-tailed Jaegers generally move north from their wintering grounds in the boreal spring and summer, although the distance of this migration may be highly variable. Some may remain in the southern hemisphere (e.g., off Peru) while many range into the northern oceans, even to near the breeding grounds, although generally remaining over offshore waters. Most two-year-old birds probably migrate into the northern hemisphere and may go inland to the breeding grounds at least briefly in late summer, after adults establish their territories.

Thus immature Long-tailed Jaegers may be seen off the west coast of North America at any time from spring through fall; some birds may be northbound, others southbound, others simply moving in response to food sources. Juveniles fledge in August (Wiley and Lee 1998) and appear off the west coast mainly from mid-August onward; by late October, most Long-tailed Jaegers have departed North American waters for points south.

Most juvenile Long-tailed Jaegers are gray-brown overall and marked strongly with light and dark barring; the undersides of the primaries show a conspicuous white flash basally, and the projecting central rectrices are bluntly pointed. Typical juvenile Parasitic Jaegers (*S. parasiticus*) are warmer brown, and Pomarines (*S. pomarinus*) are darker brown (e.g., Olsen and Larsson 1997).

The upper photo shows a typical one-year-old Long-tailed Jaeger, photographed 26 July 1997 by Jim Lomax at Cordell Bank, off Marin Co., California. In

distinguishing this bird from the Parasitic and Pomarine jaegers note its structure (the small bill and finely tapered central rectrices), lack of a distinct white flash under the primaries, and prominence of only two white primary shafts on the upperwing. The plumage of one-year-old jaegers is quite similar to that of juveniles, possibly explaining some unseasonably early reports of juveniles. Features distinguishing one-year-old Long-tailed Jaegers from juveniles are the reduction or loss of white flashes under the primary bases, reduction or loss of pale tips to the median and greater upperwing coverts), warmer-toned upperparts (often with a pale buff hindcollar), and longer central rectrices that are fine and tapered. The birds must be seen fairly well for these features to be distinguished, and many individuals may not be aged safely in the field. Also, one-year-old Long-tailed and Pomarine jaegers, with their warmer coloration and paler buff hindnecks than typical of juveniles, can be mistaken easily for Parasitic Jaegers.

The lower photo, taken by Kevin T. Karlson in early July 1995 at Prudhoe Bay, Alaska, shows a two-year-old Long-tailed Jaeger. At the age of two the birds appear variably intermediate between the first-year and adult plumages and much closer to the adult than to the juvenile. They have a distinctly contrasting dark cap, usually reduced barring under the wings, and longer central rectrices than one-year-old birds. Given present knowledge, however, some "advanced" one-year-olds may not be distinguishable from "retarded" two-year-olds. This overlap may be more prevalent in the larger Parasitic and Pomarine jaegers, whose plumage may develop more slowly. At the age of three years most jaegers of all species look enough like adults that they do not pose serious identification problems, and some Long-taileds at this age may be indistinguishable from adults.

At least off California (pers. obs.) one- and two-year-old jaegers, taken together, may be as common in fall as both juveniles and adults. I hope that appreciating the existence of these intermediate plumages may better help pelagic birders understand these challenging birds.

Foremost I thank Debra Shearwater for enabling me to study numerous jaegers at sea off central California, and Jim Lomax and Kevin T. Karlson for contributing their fine photos. I also thank Chris Corben and Bert McKee for thoughtful discussions concerning the identification and ageing of jaegers, and Corben, Robb Hamilton, Paul Lehman, and Peter Pyle for helpful comments on the manuscript. This is contribution number 759 of the Point Reyes Bird Observatory.

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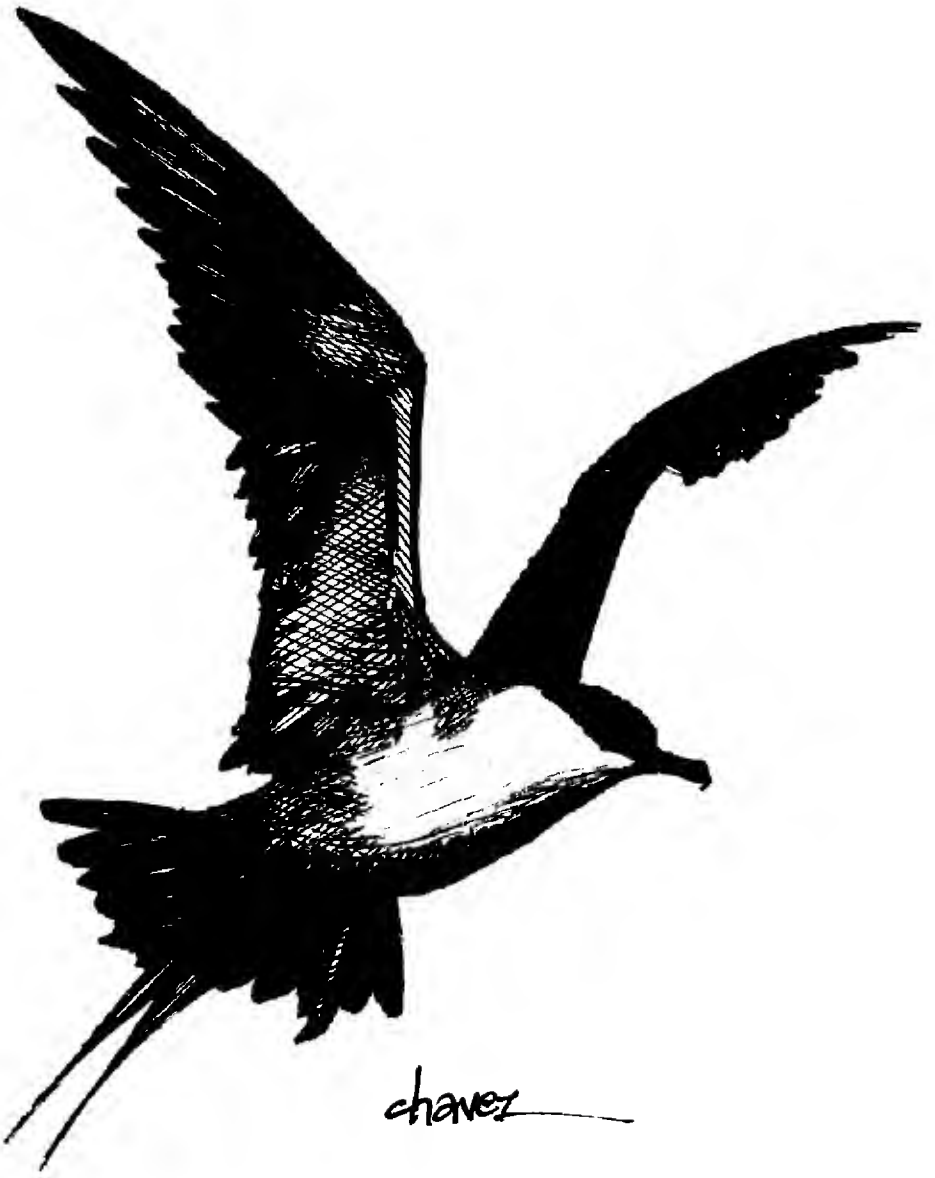

Long-tailed Jaeger *Sketch by Jamie M. Chavez*

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Turkey Vulture *Sketch by © Marni Fylling*

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